STATE OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT IN MIDDLE GANGA PLAIN
A CASE STUDY OF ALLAHABAD DISTRICT

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BY

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Dedicated to my beloved parents

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Archana Gupta

(Archana Gupta)

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ENVIRONMENT AND DEVELOPMENT : A CONCEPTUAL PROFILE

1.1. Introduction :

Geography has witnessed a paradigm shift during the last five decades after the World War II. There are different philosophical positions such as regionalism, positivism, phenomenology, behaviorism, structuralism and finally post modernism which have permeated into the thought process of geography. The paradigm shift is taking place due to changing socioeconomic conditions in the world. The population has increased from a little less than one billion in the year 1750 to six billion in 2000 AD According to UN projections this is likely to be 10 billion by 2100 AD (see fig. 1.1). Increasing population has been putting great pressure on natural resources and carrying capacity of land has shrunk significantly. The growth of population is much more in less developed regions vis-a-vis more developed regions and, therefore, the problems of the developing regions are of more serious nature than those of the developed world. "Population explosion results in over-exploitation of the resources of our mother earth. With the expansion of human settlements, forests are depleting at a rapid rate. Rapid decrease of foliage cover exerts a chain reaction on ecology. The bare surface is exposed to various agents of weathering and erosion, thereby eroding the fertile surface soil, creating gullies, choking the river beds with sediments, reducing moisture retentive capacity of the soils and increasing the run-off capacity of the rivers. As a result, the well established ecological balance of the planet earth is disturbed". (Banerjee B., 1997).

The process of industrialization has boosted the growth of urban population. Nearly 45 percent of the total population of the world is living in

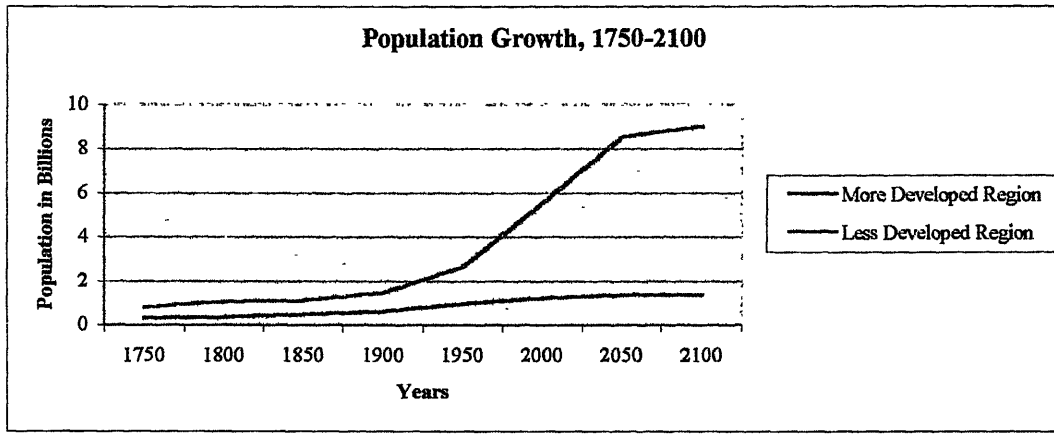


Fig : 1.1

Source : Getis, A. and Getis, J., Introduction to Geography, Iowa : wcb.

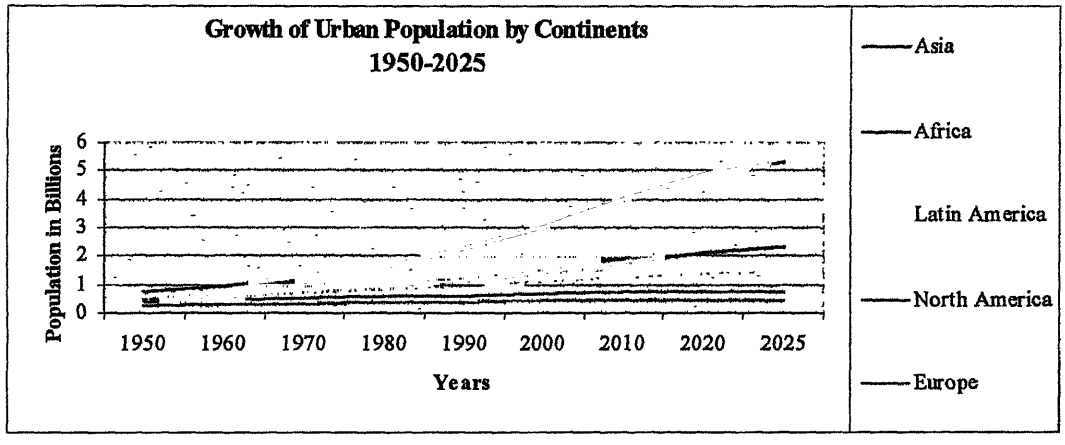


Fig : 1.2

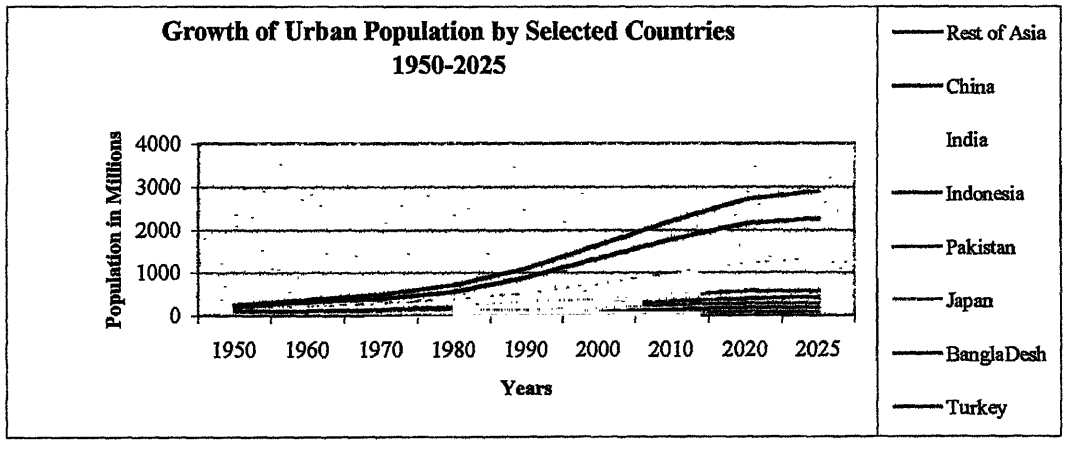


Fig : 1.3

Source : Dutta, A.K., Global Urbanization : Trend, Form and Gradients, Akron.

TREND OF WORLD URBANIZATION

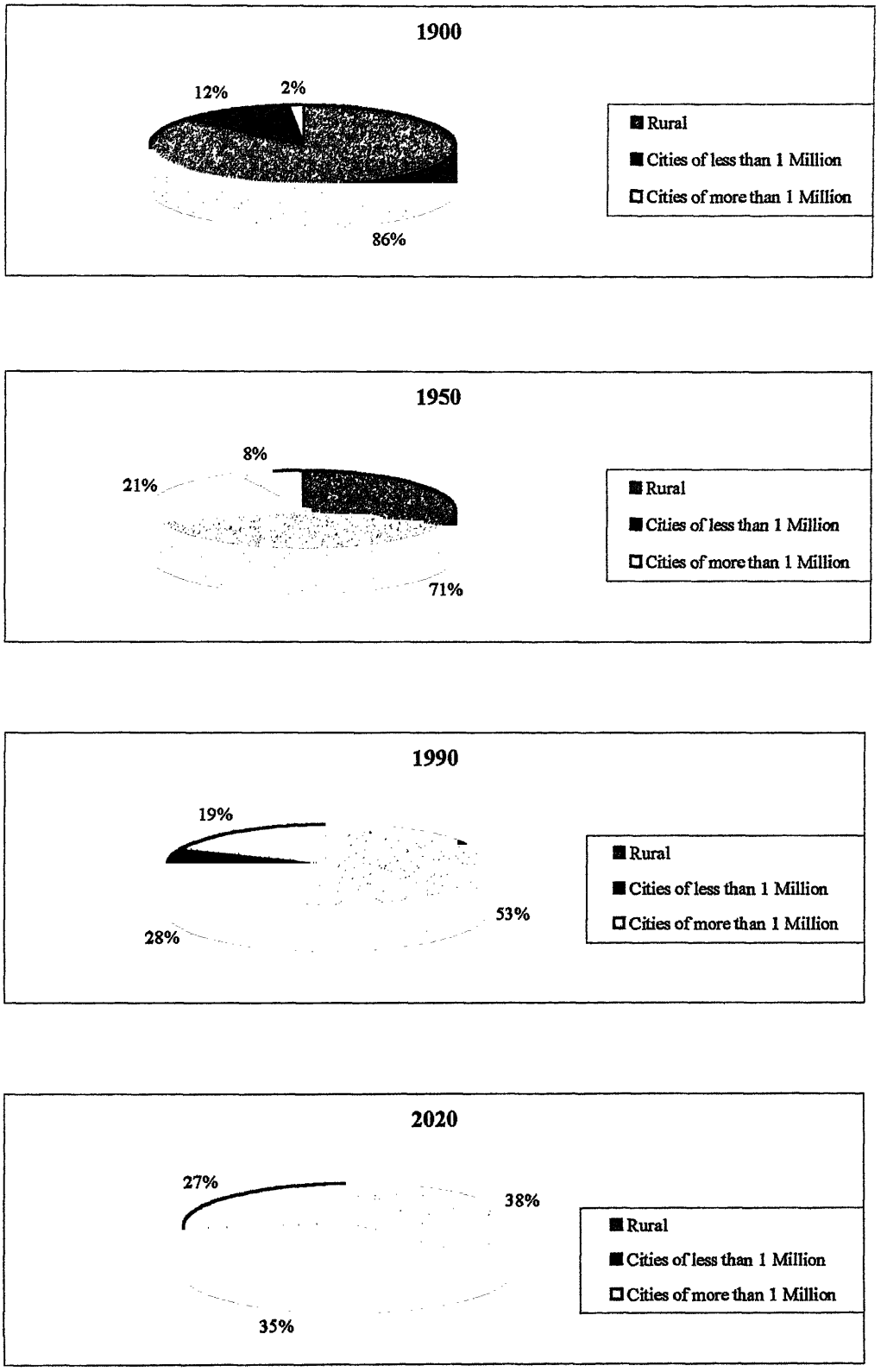


Fig :1.4

Source : Dutta, A.K., Global Urbanization : Trend, Form and Gradients, Akron.

urban areas. The urbanization in developing countries is increasing dramatically (see fig. 1.2, 1.3 &1.4). The less developed nations contain more than 60 percent of world's urban population. "The growth of cities of excessive size creates many social and economic problems, including expensive and often inadequate housing, overcrowded roads, overburdened public transport systems and pollution by smoke, fumes and noise" (knowled and Wareing, 1994). The big cities are eating lot of good and productive agricultural land. The problem is further intensified in India where people are basically dependent on farm land.

1.2. The Statement of the Problem

The scenario that is emerging due to increasing rural and urban population, rapid industrialization and technological interferences has threatened the fine balance which exists between man and environment. The environment and development, of late, have emerged as the major themes of debate today. While development is necessary to tackle the demands of the increasing population, it is equally important to keep the environment as far as possible undisturbed in order to strike a balance between environment and development. The human ingenuity of intervention with nature has been the cause of concern for quite sometime. This is a global issue, and United Nation has taken up the issue quite seriously. United Nation's conference on human development which was held in Stockholm in 1972 acknowledged the problem and focused the attention of world governments towards the awareness of interrelationship between environment and development. The meeting of the UN assembly at Nairobi in 1982 was yet another important step in creating international awareness about environmental problems. The Earth Summit held at Rio de Genario in 1992 further emphasized on the exhaustive nature of natural resources and called for an alternative mode of

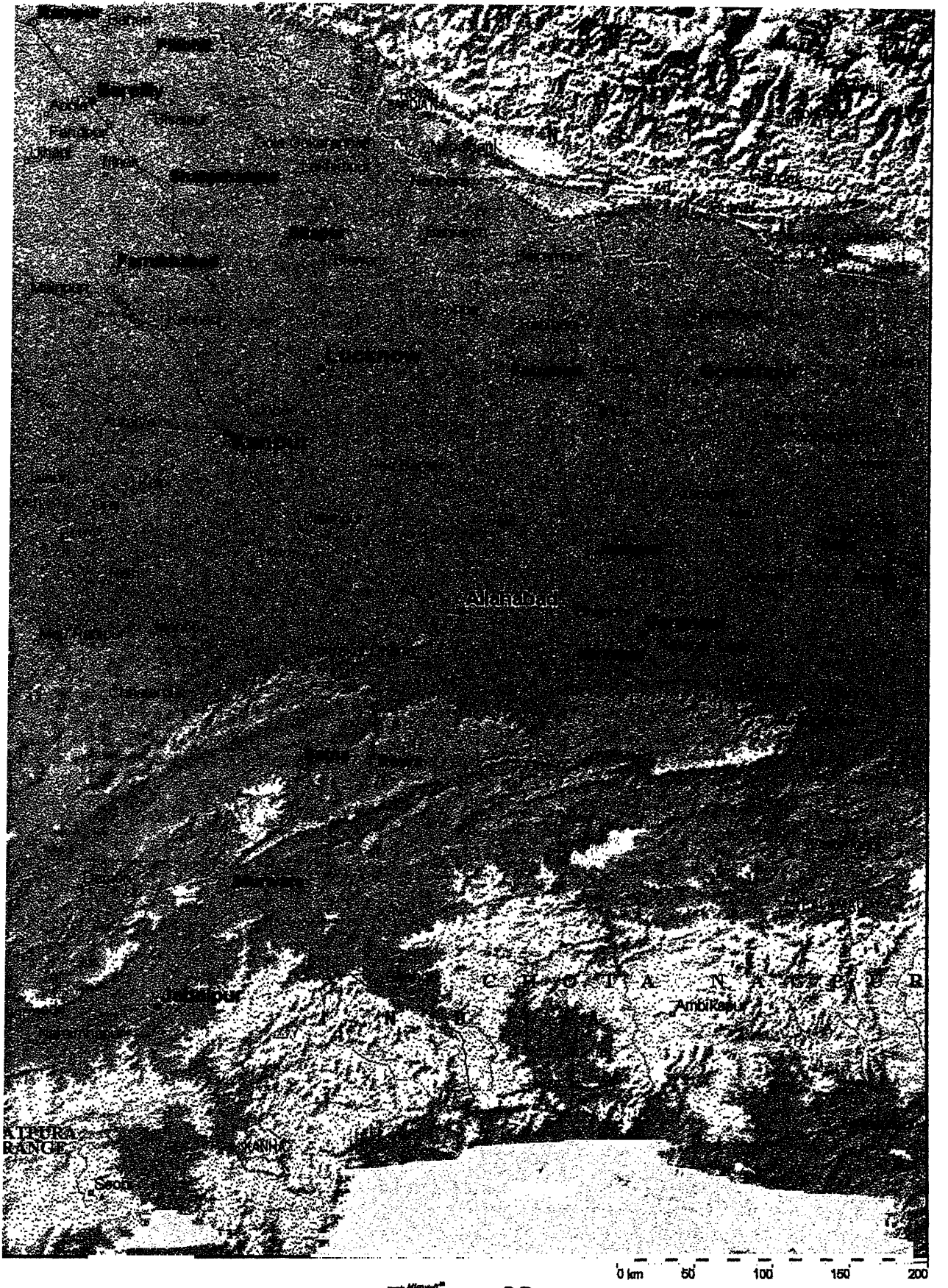
development (UNCED, 1992). The agenda 21 of this conference looks ahead to the 21st century development programme which calls for environmental impact assessment as an instrument of national and regional development policy measures.

The purpose of present research is to examine the state of the art of the environment and development and their casual co-relations in the middle Ganga plain (see fig. 1.5). This unique plain which is made of past glacial alluvium and has long history of several thousand millennia has been the cradle of human civilization from times immemorial. The area forms part of the great plain of India. "The great crescent of alluvium from the delta of the Indus to that of the Ganga represents the infilling of a foredeep warped down between the Gondwana block and the advancing Himalayas" (Spate etc., 1967). The present study deals with a micro region of this vast unit by selecting the case of Allahabad district.

1.3. Conceptual Background :

(a) On the concept of environment and ecosystem

The dynamics of man-environment relationship and thereby the development have drawn our attention for quite some time. The debate on man-environment relationship has assumed much more significance in the current context because it has been noted that environment and development are not getting along properly. The popularly held notion that nature sets the stage for human development is not tenable any more. There are three models of man-environment relationship that have permeated in thought. These are (a) man in harmony with nature, (b) man as subordinate to nature and (c) nature as subordinate to man. The man as modifier and conqueror of nature view has, however, dominated modern thought. But the other two perspectives are equally



ENCARTA 98 WORLD ATLAS

Allahabad
India

Fig.: 1.5 MIDDLE GANGA PLAIN

important. These conservative and radical views have set the necessity for ecosystem analysis.

"Environment refers to the sum total of condition that surrounds man at any one point at earth surface" (Haggett, 1975). The uniqueness of environment lies in the fact that it supports and favours all forms of life including human beings. Thus environment has many forms such as physical environment, social environment, economic environment, cultural environment and political environment etc. The man carves out different types of environment within broad frame and canvas of physical environment. Broadly speaking there are two divisions of environment. These are: (i) biotic environment which is represented by biosphere and (ii) abiotic environment which is represented by a combination of lithosphere hydrosphere and atmosphere (see fig. 1.6). The biotic environment refers to plants, animals and other micro-organisms and therefore, it is dynamic in nature. Each one of these subdivisions has it's own properties and rate of change. However, the interaction among these determines the special character of the local environment (Haggett, 1975). Each local environment consists of an ecosystem which has a very broad conceptual background.

Ecosystems are open systems where there is a continuous flow of energy and matter across the boundary and, therefore, it is hard to demarcate the boundaries. The source of energy is sun which also regulates the flow of water and also causes changes in the environment. The matter comes from minerals, H_2O, O_2, and CO_2. The energy from the sun enables the conversion of inorganic materials into organic materials leading to different forms of life. The ecosystem concept is a useful model for examining the structure and functions of life (Bryant, 1994). The term ecosystem is the contraction of phrase ecological

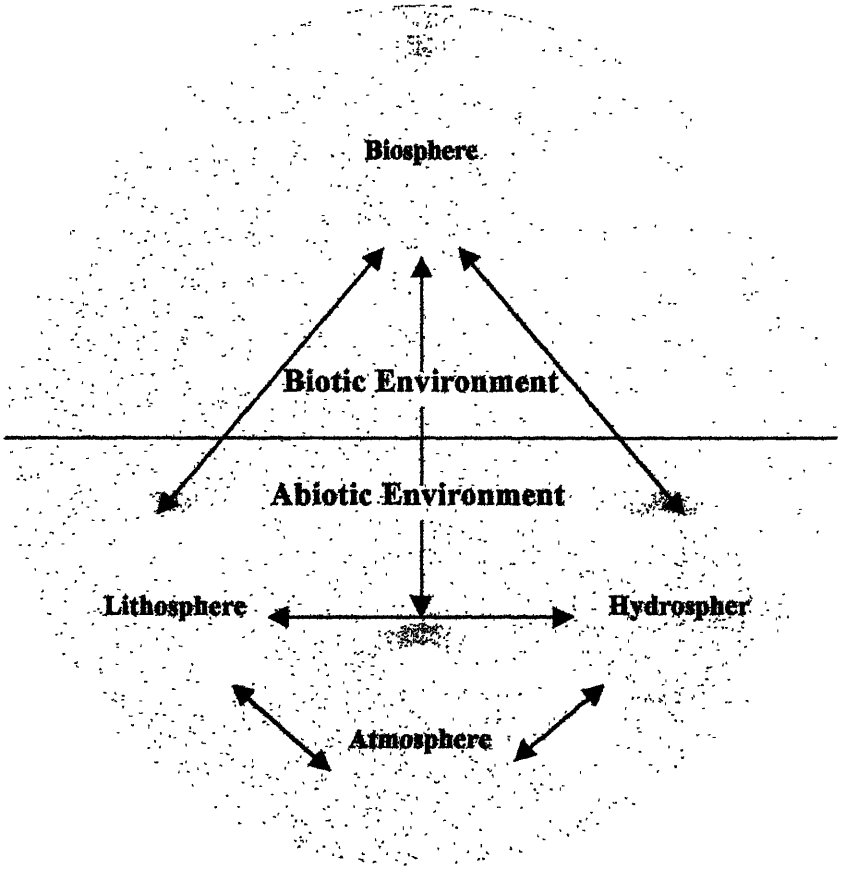


Fig: 1.6 **MAJOR DIVISIONS OF ENVIRONMENT**

Source : Haggett, P.,1975 : Geography A Modern Synthesis, New York

system. The word ecology dates back to 1868 when German biologist Ernst Haeckel used it for the first time. It comes out from the Greek word 'OIKOS', meaning a house or a place to live in and, therefore, it has a direct concern to geographers. In ecosystems plants and animals are linked to the environment through a series of feedback loops. The food chain describes the series of stages that energy goes through in the form of food within ecosystem. Food webs are complex networks of food chains. The trophic levels are main stages in the food chain. Man has a very delicate balance with the ecosystem. These ecosystems are regulated by carbon cycle, nitrogen cycle, hydrological cycle and nutrient cycle etc.

The delicate balance between man and ecosystem has been under continuous threat due to too much use of natural resources by man to his advantage. The indiscriminate and the injudicious exploitation of natural resources, the process of intensification of agriculture, rapid industrialization and urbanization have been causing alarming situation. The rapid growth of population has further worsened the situation. The non-renewable resources all vanishing fast and mechanism for using renewable resources are not in consonance with the need of man. In fact the greed of man has almost threatened the delicate fabric that exists between man and nature. One is reminded of Mahatma Gandhi's oft quoted statement when he observed, "There is enough for every body's need but not for every body's greed". This situation calls for reviewing the state of development at different regional units.

(b) On the concept of development

The development is the process of evolution and it has been taking place since prehistoric times. The hunting, hurding, food gathering, agriculture,

industry, commerce, transport and trade, services and technological innovations and mass production and consumerism are different stages of development. The development is a philosophical concept and scholars attribute different meaning to development. It is basically the style of change to satisfy social, economic and cultural needs. It is a situation in which man has full freedom to choose his livelihood and select the living style according to his choices. This is not possible to define development by one or two parameters or by selecting some arbitrary indices. Virtually it is a dynamic and multi-dimensional concept which could be varying in different ecological systems. According to Misra (Misra, R.P., 1985) development means :

(a) Increase in material welfare through increased productivity;

(b) Increase in social welfare through education, health programme and so on;

(c) Improvement in the social content of human life : rich family life, community feeling, art, music and so on, depending on individual interests and preferences;

(d) Increase in safety, freedom and opportunity and also sense of participation in local, regional and national affairs; and

(e) An equitable distribution of the fruits of development among different groups of people and among different regions of the country.

Man has changed the physical environment by intervening at different stages such as by depletion of forest, construction of roads, houses, building, cities, farms and factories. This has resulted into different forms of pollution such as air pollution, water pollution and noise pollution etc. The condition has reached to a situation wherein disasters due to flood, drought, earthquakes, landslides, climatic changes, global warming, ozone depletion and different forms

of pollution have become the cause of concern. This situation calls for environmental impact assessment, protection and management of resources as also serious thinking for an action plan leading to sustainable development - a development which is not only environment friendly but also environment enriching.

The paradigm shift in the development thought is explicitly visible from the changing meaning that it has assumed during the last two decades. In fact the environmental dimension has become more important than the economic dimension. Even social component plays critical role in the developmental objective. The academics have realized the shortcomings of economic growth and, therefore, warned about it's limits which is commonly known as the limit of growth (Meadows, D.C. et al., 1972). Currently there is a great thrust on sustainable development. According to WCED (1987), it is a development that meets the needs of the present without comprising the ability of future generation to meet their own needs. The term 'need', here, basically refers to essential needs of the worlds' poor to which overriding priority should be given (Chattopadhya & Carpenter, 1991). The components of sustainable development have been displayed in figure 1.7. The four components of sustainable development are :

(1) minimum use of resources which are non-renewable (fossil fuels, minerals, loss of bio-diversity).

(2) Sustainable use of reversible resources (water, soil, biomass, solar energy, tidal energy etc.).

(3) Retention of the waste of a living which is well within the absorptive capacity of water bodies.

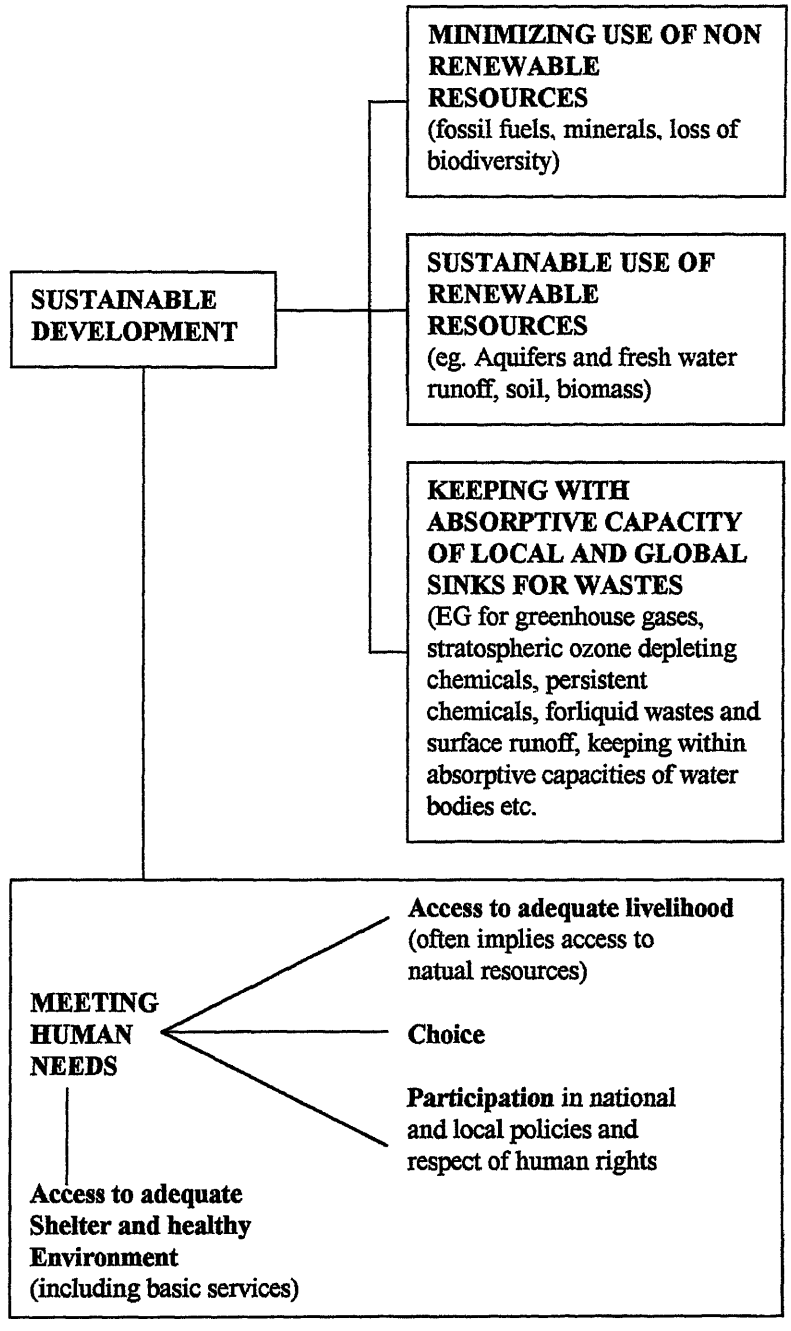


Fig: 1.7 **COMPONENTS OF SUSTAINABLE DEVELOPMENT**

Source : Environment and Urbanization, Vol. 4, No. 2, Oct., 1992.

(4) Meeting human needs in terms of adequate shelter, and healthy environment, access to adequate livelihood and participation in national and local politics and respect of human rights, with complete choices (Environment and Urbanization, 1992).

There are several scholars who have tried to explain the meaning of sustainable development such as Pearce (1988), Myers (1990), Ekins (1991), Bidwell (1992), Mitchell (1993) and Wood (1993). Shafi has tried to enumerate the processes which may lead to sustainable development. He observes, "For sustainable development we have to combat poverty, change consumption pattern (developed countries), bring down the growth rate of population (developing countries), conserve and manage the resources of development, combat deforestation and desertification, protect the atmosphere from toxic gases, conserve biological diversity and sustainable rural and mountain development. These measures will lead to a glorious habitable earth not only for the present generation but also for posterity". (Shafi, 1993). Sustainable development is essentially a development which is socially acceptable, economically viable and environmentally eco-friendly (Misra, 2000).

In order to prevent the environmental damage and bring the state of sustainable development, it is essential to have environmental impact assessment (E.I.A.) which has emerged as an important concept. According to Munn (1975), E.I.A. is an activity designed to identify, predict, interpret and communicate information about the impact of man's action on his health and well-being of ecosystem on which man's survival depends. It is, thus, planning aid concerned with identifying, predicting and assessing impacts arising from proposed activities such as policies, programmes, plans and development projects that may affect the

environment (Bisect, 1983). Smith (1996) has underlined three components of environmental impact assessment which are technological, environmental and social. These elements combined together are taken into account in environmental impact assessment.

1.4. Review of Literature :

The studies pertaining to environment and development are gradually increasing in number because this has become the cause of concern both in developed and developing countries. While there are several studies which have been done in the west, the studies in the Indian context were introduced by a report brought by the Center for Science and Environment (C.S.E., 1982). The theme of environment and development since then has caught the attention of Indian geographers and scholars. The paper by Misra & Misra (1986) on human survival and development focuses on land, water and mineral resources and thereby attempts to warn about the catastrophic situation which may occur due to overexploitation of these natural resources. Likewise United Nations has focused it's attention on diminishing natural resources (United Nations, 1992). In 1993 an Indo-British Geography seminar was organized by Professor H.N. Misra, The proceeding of the seminar contains several papers (Mukherjee & Agnihotri, 1993). The paper entitled Human Environment - Then and Now written by Das Gupta (1996) presents a good summary on thought of environment and development with special reference to India.

The population explosion, food security and sustainable development have become important themes among geographers (Banerjee, 1997). The priority and need for sustainable development in India is being considered in a big way (Agrawal, 1996 & Sircar, 1997). The paper written on principles and methods of

Terrain analysis by Chattopadhyay & Chattopadhyay (1998) and application of geographical information system technology for environmental monitoring and forecasting in India by Singh (1998) indicate not only the method but also the trend that is gaining momentum in Indian geographical studies.

1.5. Major Hypothesis

The description, explanation and analysis are based on some assumptions and hypotheses. Some of the hypotheses which have been examined in the body of this thesis are as under :

1. Hydrogeomorphological evaluation forms the basic input for developing the sustainable development model.
2. The environmental deterioration has given rise to spatial inequality and environmental hazards.
3. The human perception and behaviour based on experiential knowledge.
4. The sustainable development model has several policy implications.

1.6. Methods and Approaches

The dissertation uses both deductive as well as inductive approaches for the purposes of explanation. While deductive or theoretical approach provides the basic background, the inductive or empirical approach has been used for building blocks of information in order to deduce generalizations. The qualitative method has been used for the purposes of description but the quantitative method has been used for bringing precision in the analysis and interpretation. The following procedures have been adapted for completing this dissertation :

(a) Library Consultation :- This has been done in order to know the existing theoretical implications on environment and development as well as on sustainable development modeling.

(b) Field Experience :- The field work was undertaken to collect primary information about some sensitive environmental issues.

(c) The cartographic and GIS Mapping :- The mapping of geographic details based on digital cartographic techniques and satellite imageries was done for the basic details. The maps were also prepared by using the GIS packages Auto Cad-14 and Map Info Professional 5.0.

(d) Modeling :- An effort has been made to suggest sustainable development model and some suitable policy imperatives which may help in action-oriented programmes which may be socio-economically rewarding as well as environment enriching for the counting in general and the area under study in particular.

1.7. Data Sources :

The present thesis represents a blend of primary and secondary data sources. The secondary data sources have been used to present the basic background of the study area. In this context the District Gazetteer, the socioeconomic tables, district statistical bulletins for different years and some other governmental publications have been collected. The data pertaining to landuse / landcover, infrastructure facilities and other socioeconomic details were collected from these sources. The data pertaining to hydrogeomorphology, wasteland and wetland were obtained from the satellite imageries by courtesy of Remote Sensing Application Center, UP. The toposheets of the study area based on the R.F. 1:50,000 and 1:250,000 have also been used for slope analysis, drainage and physical profile. The climatological data has been obtained from the census records, tahsil records and meteorological station at Bamrauli. The

population data has been taken from district census handbook. Unfortunately the district information center could not provide the latest data of population.

The primary data sources have been collected through field survey by selecting 15 villages randomly. The data pertains to the human perception regarding some of the environmental hazards such as forest depletion, wastelands, wetlands and floods.

1.8. Area of Study :

The district of Allahabad (24°47'N to 25°47'N Lat. and 81°09'E to 82°21'E Long.) (fig. 1.8 and 1.9) which forms part of the great Ganga plain has been selected for studying the interaction between environment and development. Extending for a length of 117 kms from east to west and 101 kms from north to south, it covers an area of 7261 sq.km. It is bordered by the districts of Varanasi in the east, Mirzapur in the south-east, Rewa of Madhya Pradesh in the south, Banda in the south-west, Fatehpur in the west and Pratapgarh and Jaunpur in the North. The famous city of Allahabad (25°30' N to 81°55' E, MSL 103.63 m.) which is of great historic antiquity is located at the confluence of three rivers-the Ganga, the Yamuna and the invisible Saraswati. The geography of the district has been mainly carved out by these river systems. The district represents 2.5 percent of the total land area of Uttar Pradesh and stands seventh in the state. The area is represented by survey of India toposheet 63G, 63H, 63K and 63L. It has a total population of about 50 lakh. The study area ranks first[1] in terms of population among all districts of Uttar Pradesh There are altogether 3945 villages of different

[1] This is the position according to 1991 data, before carving out of Uttaranchal from the state of Uttar Pradesh and also before the district of Kaushambi was formed from Allahabad district.

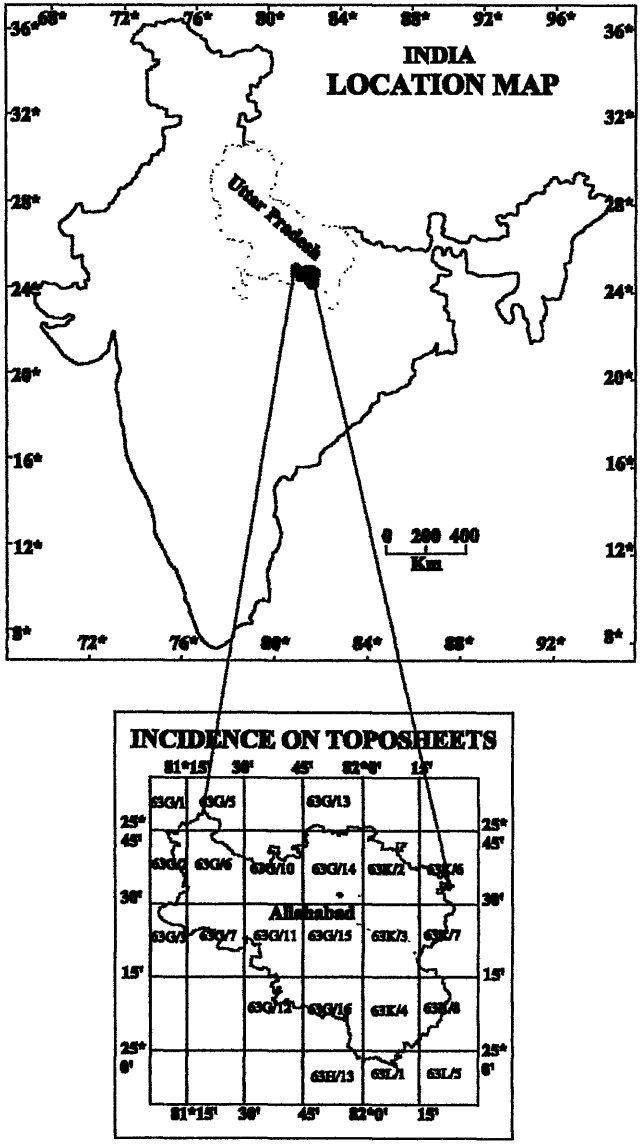

INDIA
LOCATION MAP
Uttar Pradesh
0 200 400
Km
INCIDENCE ON TOPOSHEETS
Allahabad
63G/1
63G/5
63G/13
63G/6
63G/10
63G/14
63K/2
63K/6
63G/7
63G/11
63G/15
63K/3
63K/7
63G/12
63G/16
63K/4
63K/8
63H/13
63L/1
63L/5

Fig : 1.8

sizes. Only 3539 villages are inhabited. The district is divided into 9 tahsils and 28 development blocks.

As stated earlier, the basic goal of the present research is to appreciate the environment and development in the middle Ganga plain by selecting the case study of the district of Allahabad. The purpose is to dwell upon the state of the art of environment and development and thereby to see the changes that are taking place in the two. The development is consequent upon environment and therefore in the present chapter an attempt has been made to explain the conceptual profile of the environment, development and sustainable development.

1.9. Organization :

The theme of the dissertation has been divided into six chapters. Chapter one focuses on conceptual background of environment and development. The state of physical environment has been discussed in chapter two. The state of socioeconomic environment forms the theme of chapter three. The consequential impact analysis dealing with spatial inequality, environment hazards and human perception has been dealt in chapter four. The sustainable development planning has been evolved in chapter five. Finally in chapter six, summary, conclusion and policy imperatives have been underlined.

References :

Agarwal, A.(ed)., 1996 : *Down to Earth*, Vol. 5, No. 10, 31-39.

Agarwal, Anil & Narain, Sunitha, 1982 : *State of India's Environment*, New Delhi : CSE.

Banerjee, Bireswar, 1997 : Population Explosion, Food Security and Sustainable Development, *Geographical Review of India*, Vol. 59, No. 1, 8.

Bidwell, R., 1992 : Sustainability : The Link Between Conservation and Economic Benefits, *Environmental Impact Assessment Review*, Vol. 12, No. 1 & 2, 37-48.

Bisect, R. (ed), 1983 : *Introduction to methods for Environmental Impact Assessment and Planning Unit*, Environment Impact Assessment, Martinis Nijhoff, The Thague.

Bryant, R.H., 1994 : *Physical Geography Made Simple*, New Delhi : Rupa & Co., 234.

Chattopadhyay, S. and Carpenter, R.A., 1991 : Sustainable Development : Scientific Jargan or A Practical Management Alternative? *Annals, The National Association of Geographers, India*, Vol. 11, No. 2, 2.

Chattopadhyay, S. and Chattopadhyay, M. 1998 : Principles and Methods for Terrain Analysis : A pilot study of Kerala, in Misra, H.N. (1998), *Research Methodology in Geography - Social, Spatial and Policy Dimensions*, Jaipur and New Delhi : Rawat, 176-193.

Das Gupta, S.P., 1996 : Human Environment - Then and Now, *Geographical Review of India*, Vol. 58, No. 3, 196-206.

Dutt, A.K., 1996 : *Global Urbanization : Trends, Form and Density Gradients,* Akron : University of Akron.

Ekins, P., 1991 : A Strategy for global Environmental Development, *Development*, No. 2, 64-73.

Environment and Urbanization (1992), Vol. 4, No. 2, 3.

Gatis, A., Gatis, J. & Fellmann, J., Introduction to Geography, Iowa : Wm.C. Brown Publishers,163.

Haggett, Peter, 1975 : *Geography of Modern Synthesis*, New York : Harper and Row, 11, 58.

Knowled, P. and Wareing, J. 1994 : *Economic and Social Geography Made Simple, New Delhi :* Rupa Co., 217, 234.

Meadows, D.C. et al., 1972 : *The Limits to Growth*, A Report for the Club of Rome's Project on the Predicament of Mankind Universe, New York..

Misra, H.N., 2000 : *Environmental Monitoring and Management of Watersheds in Himalayan region : A case study of Shirkhad,* Project Report, Almora, Govind Ballabh Pant Institute of Himalayan Environment and Sustainable Development.

Misra, R.P. and Misra, H.N., 1986 : Human Survival and Development : Focus on Land, Water and Mineral, *Annals, The National Association of Geographers, India*, Vol. 6, No. 2, 21-38.

Misra, R.P., 1985 : *Development Issues of Our Time*, New Delhi : Concept. 2-3.

Mitchell Bruce, 1993 : Sustainable Development, Uncertainty and the Precautionary Principle, *The Indian Geographical Journal*, Vol. 68, No. 1, 1-4.

Mukherjee, A. and Agnihotri, V.K., 1993 : *Environment and Development*, New Delhi : Concept Publishing Co.

Munn, R.E. (ed), 1975 : *Environment Impact Assessment; principles and procedures*, Munn, R.E., Scope 5, Report of ICSU, Chichester : John Wiley.

Myers, N., 1990 : *Sustainable Development : The Role of NGOs* (Forestry for Sustainable Development, Working Paper No. 8), St. Paul : University of Minnesota.

Pearce, D., 1988 : The Sustainable Use of Natural Resources in Developing Countries, in Turner, R.K. (ed), *Sustainable Environmental Management*, Belhaven : Bellhaven Press.

Shafi, M., 1993 : Perspectives on Environment and Development, in Mukherjee, A. and Agnihotri, V.K. (ed), *Environment and Development*, New Delhi : Concept Publishing Co., 66.

Singh, R.B., 1998 : Application of Geographical Information System Technology for Environmental Monitoring and Forecasting in India, in Misra, H.N. (1998), *Research Methodology-Social, Spatial and Policy Dimensions*, Jaipur and New Delhi : Rawat Publications, 255-271.

Sircar, P.K., 1997 : Sustainable Development in India, *Geographical Review of India*, Vol. 59, No. 1, 75-81.

Smith, L.G., 1996 : *Impact Assessment and Sustainable Resource Management*, England : Addison Wesley Longman Limited.

Spati, O.H.K. and Learmonth, A.T.A., 1967 : *India & Pakistan*, London : Methuen, 41.

United Nation Conference of Environment Development (UNCED), 1992 : *Earth Summit Agenda 21 : Programme for Action for Sustainable Development*, New York : United Nation.

United Nations, 1992 : *World Population Projection*, New York.

WCED, 1987 : *Our Common Future*, New York : Oxford University Press.

Wood, D.M., 1993 : Sustainable Development in the Third World : Paradox or Pancea? *The Indian Geographical Journal*, Vol. 68, No. 1, 6-16.

Chapter 2

STATE OF PHYSICAL ENVIRONMENT

The previous chapter focuses on the conceptual background of the study and, thus, aims and objectives of the study, concept of environment and development, review of literature, data sources, methodology etc. have been discussed at length. The present chapter aims at analyzing the state of physical environment of the study area by focussing on climatic characteristics, drainage and watershed, relief and slope, geological formations, soils and hydrogeomorphological characteristics.

2.1. Climatic Characteristics :

One of the most important phenomena which is fundamentally responsible for carving out the physical environment is climate. The climatic elements such as temperature, rainfall and humidity etc. are responsible for the hydrological cycle and the hydrological cycle in turn is responsible for the physical landscape or topography.

The study area forms part of the great Ganga plain and, therefore, it is characterized by the similar climatic conditions. The variations in the rainfall, temperature and relative humidity of the area under study have been shown in the table 2.1. These variations have been shown through graph (see fig. 2.1). It is clear from this graph that the months of June, July, August, September and to some extent October are quite significant from the view point of rainfall. These are the periods when the relative humidity is also quite high. The graph also shows the fluctuation in the maximum and minimum temperature in the study area. The mean monthly rainfall based on ten years' average is presented in table

Table : 2.1

CLIMATOLOGICAL DATA [AVERAGE OF 10 YEARS] DISTRICT ALLAHABAD, 1986-1996

Months	Rainfall (in mm.)	Max. Temp. (in c.)	Min. Temp. (in c.)	Relative Humidity (in percent)
JAN	16.81	22.60	8.30	81
FEB	15.77	26.60	10.80	68
MAR	8.37	33.30	15.60	48
APR	8.21	39.10	21.90	37
MAY	14.10	41.00	26.20	39
JUN	82.98	39.70	28.10	55
JUL	180.41	34.40	26.30	76
AUG	194.49	33.00	25.60	81
SEP	129.77	33.00	24.40	84
OCT	44.11	33.10	20.10	72
NOV	30.21	29.60	13.80	66
DEC	22.98	25.10	8.90	79
Average	62.35	32.54	19.17	65.50

Source : Airforce Station, Bamrauli, Allahabad.

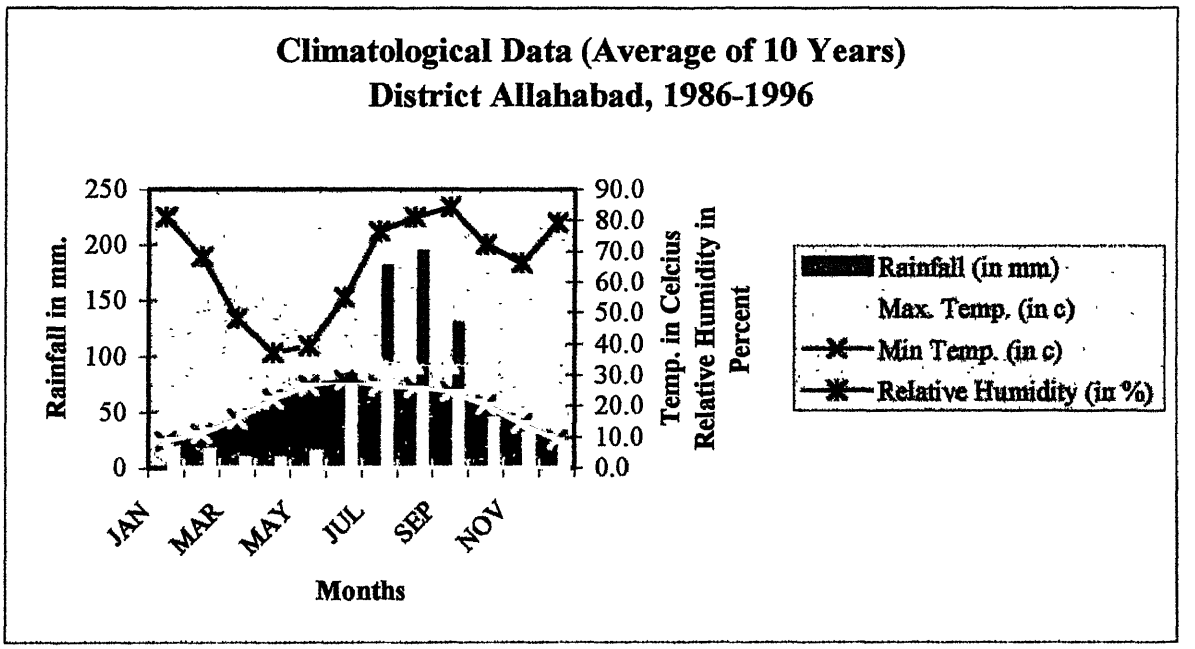


Fig : 2.1

2.2. While this table shows the variation of rainfall during twelve months, it also shows the spatial variation. The fig. 2.2 has been prepared on the basis of table 2.2. The region under study is characterized by typical seasons and the four seasons which may be identified are :

I. Winter season

II. Summer season

III. Monsoon season

IV. Retreating monsoon season.

(I) Winter Season :

The winter season commonly sets in by the middle of October and the month of January records the lowest temperature, the mean of this month being 15.5°C. Sometimes the spell of cold waves from north-western Himalayas causes the temperature to fall as low as 3°C. The south-west monsoon becomes completely feeble and the weather on the whole is characterized by moderate temperature, clear sky and higher humidity. The frost are not uncommon during this season. There is occasional spell of rainfall due to north-westerly cyclone but such rains donot lost longer (Misra, 1984).

(II) Summer Season :

There is a change in the season from the month of March which signals the onset of summer season. The summer extends up to the month of July. The months of May and June record highest temperature. The temperature in the month of June is sometimes 47°C. Dust storms and thunder storms are quite common. The strong westerly winds which are the results of convective air

Table : 2.2

MEAN MONTHLY RAINFALL [IN MM.]
DISTRICT ALLAHABAD,1986-1996

Tahsil	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Average
Sirathu	22.72	18.20	10.18	15.45	21.30	80.47	204.26	217.47	132.07	76.90	16.80	17.80	69.47
Manjhanpur	21.67	13.18	8.20	18.08	28.28	93.31	208.39	209.04	152.65	49.96	33.90	22.60	71.61
Chail	13.56	23.58	9.15	2.00	23.40	99.20	171.45	186.67	125.69	36.40	40.50	27.72	63.28
Soraon	27.03	12.48	16.00	11.60	11.00	56.89	131.23	191.08	141.11	35.22	20.50	19.86	56.17
Phulpur	10.75	8.40	4.40	11.80	1.60	74.74	182.39	201.60	150.36	67.06	21.95	26.13	63.43
Handia	16.00	16.61	5.84	5.04	21.36	96.38	185.29	222.88	167.71	22.19	15.20	17.12	65.97
Jasra	6.20	13.38	5.00	0.00	3.50	30.63	83.30	117.48	17.54	30.37	70.10	28.48	33.83
Karchhana	5.43	12.10	5.65	3.40	6.20	64.47	148.73	112.92	72.57	15.98	16.80	16.98	40.10
Meja	27.90	24.00	10.90	6.50	10.30	150.74	308.64	291.27	208.27	62.95	36.13	30.15	97.31
Average	16.81	15.77	8.37	8.21	14.10	82.98	180.41	194.49	129.77	44.11	30.21	22.98	**62.35**

Source : Board of Revenue, Allahabad.

MEAN MONTHLY RAINFALL
DISTRICT ALLAHABAD, 1986-1996

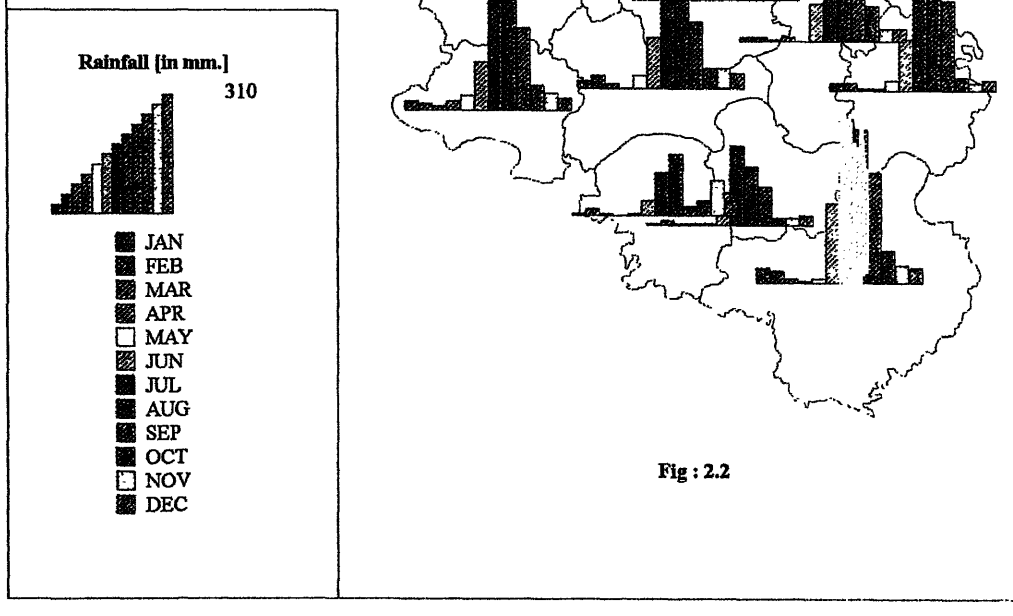


Fig : 2.2

movement due to heating of surface are responsible for raising the temperature. The relative humidity is very low and the rainfall is insignificant.

(III) Monsoon season :

This is the rainy season which starts in the last week of June and continues until the month of September. The south-westerly monsoon is responsible for the rainfall which is maximum during this season. The day temperature comes down to 35°-38°C. The months of July and August are the rainiest months.

(IV) The retreating monsoon season :

This is the withdrawal period of the wet monsoon. This is the transitional period of very short duration. Dwivedi remarks, "Occasional cyclonic storms from the Bay of Bengal give cloud and rain to Allahabad and its neighborhood in the early part of the October which receives a mean rainfall of more than 2 inches. This period is commonly characterized by the cool, calm and clear skies during day and night" (Dwivedi, 1960).

2.2. Drainage System and Watershed Regions :

While hydrogeomorphology gives an idea of underground water prospects, the drainage system provides an idea of the main sources of surface water which plays critical role in extending irrigational facilities. Irrigation plays very important role in the agricultural productivity of this region. The drainage system of the study area consists of the river Ganga, the Yamuna and the Tons and their tributaries (see fig. 2.3).

The Ganga system drains the major part of the study area especially the northern part. Running for a distance of about 125 kms from west in Sirathu tahsil to Handia tahsil in the east, it forms many curves in between. The curves are distinctly visible near the confluences with the Yamuna and the Tons river. During

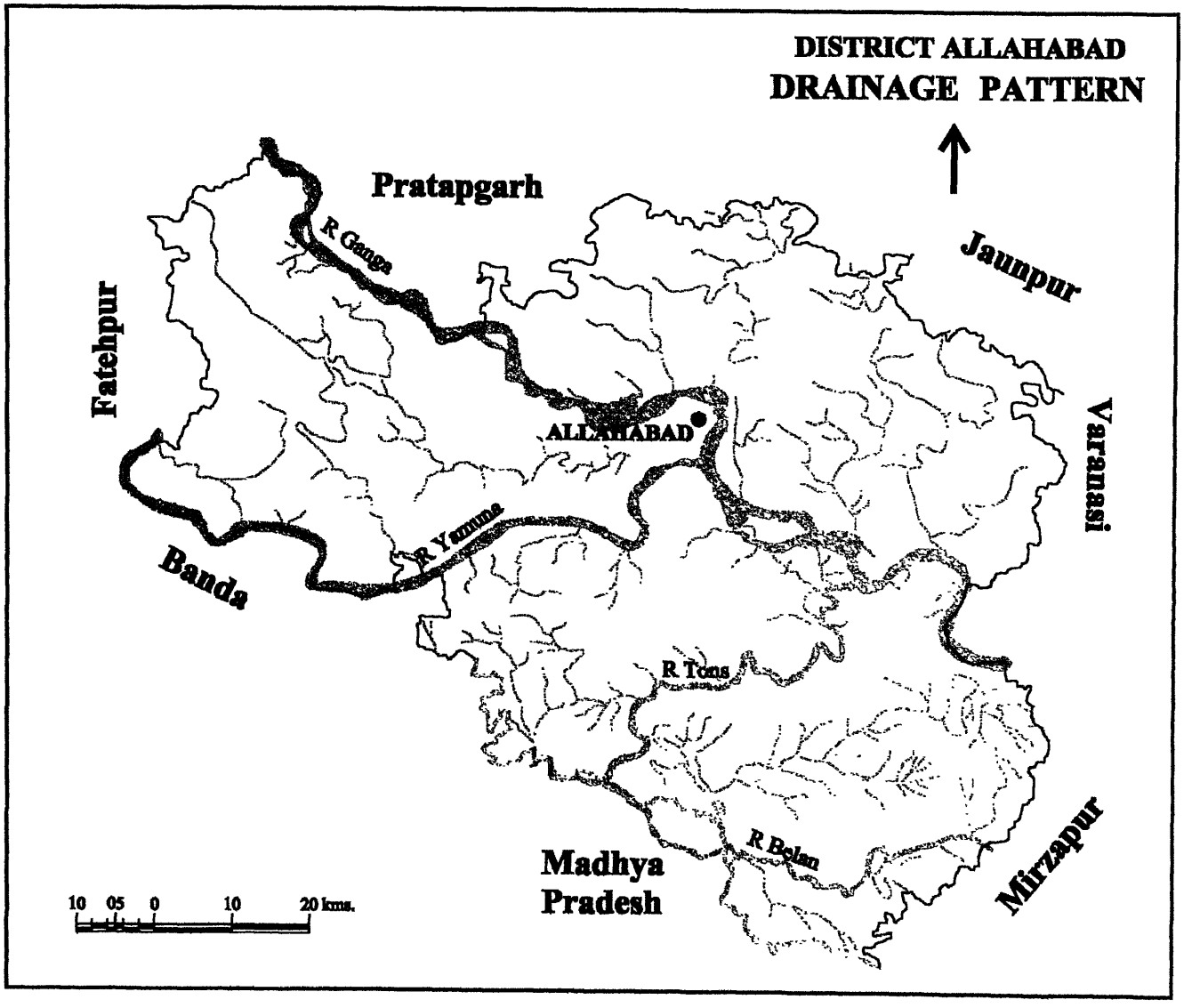

DISTRICT ALLAHABAD
DRAINAGE PATTERN
Pratapgarh
R Ganga
Jaunpur
Fatehpur
ALLAHABAD
Varanasi
R Yamuna
Banda
R Tons
R Belan
Madhya
Pradesh
Mirzapur
10 05 0 10 20 kms.

Fig : 2.3

rainy season it extends for 3-5 km. due to spate of water but it bifurcates into several channels during winter and summer seasons due to scarcity of water.

The Yamuna system mainly drains the south and south-western part of the study area. The Sasur Khaderi is an important tributary of the Yamuna which forms the central drainage channel of the doab joining the Yamuna at its left bank in Chail tahsil (Misra, 1984).

The Tons system emerges from hills of Madhya Pradesh and meets the Ganga river near Sirsa. There are several seasonal channels which join the Tons river but they are dry for greater part of the year. The Lapari is by far the most important tributary besides the Belan river which meets the Tons in Meja tahsil. The Tons system constitutes the drainage of the upland area of the study region (Misra, 1984).

Based on the detailed analysis of the drainage system, the study area may be divided into several watersheds. The watersheds are most important hydrogeological units which provide ideal regional units for sustainable land use planning. Watershed management is an integral part of the planning process for optimum development of land, water and plant resources to meet the minimum requirement of the people in a sustained manner and style (Misra, 2000). "Watershed is a geohydrological unit draining runoff water at a common point which can be demarcated based on ridge and gully line" (NRSA, 1996). The All India Soil and Landuse Survey, 1988 has delineated the watershed boundaries of India. Based on the hierarchic coding system of AIS & LUS, 1988 the study area has also been classified into (a) sub watershed, (b) mini watershed and (c) micro

watershed. The sub watersheds vary between 30-50 km^2; mini watersheds vary between 10-30 km^2 and the area of micro watersheds lies between 5-10 km^2. The study area falls in Watershed Region-II in the national level classification. The aerial spread of the watershed in the study area has been displayed in the fig. 2.4. The hydrogeomorphological character of these watersheds may be matched with fig. 2.7.

2.3. Relief and Slope :

The entire study area has been basically formed by the alluvial deposits brought by the Ganga, the Yamuna and their tributaries. This is basically a level and featureless expansion commonly known as the Ganga Plain. The Yamuna cliff (Pabhosa hill) with an elevation of 173 meters in the south is the only noteworthy outcrop of the Vindhyan rock. The average height of the plain is 102 meters from the mean sea level. The height increases from north to south and the general slope is from west to east.

The entire study area represents a monotonous surface feature with very little variations. Nevertheless, the characteristic feature of the area can be analyzed by dividing it into the following three microgeographical units (see fig. 1.9).

(i) The Trans-Ganga Tract :

This is represented by the tahsils of Soraon, Phulpur and Handia. This is characterized by Khadar and Bangar tracts. The Khadar tracts are found in narrow stretch along the Ganga river. The high banks of the Ganga are broken by ravines and small channels. There are few patches of alkaline efforscene called Usar. There are some depressions characterized by high water table.

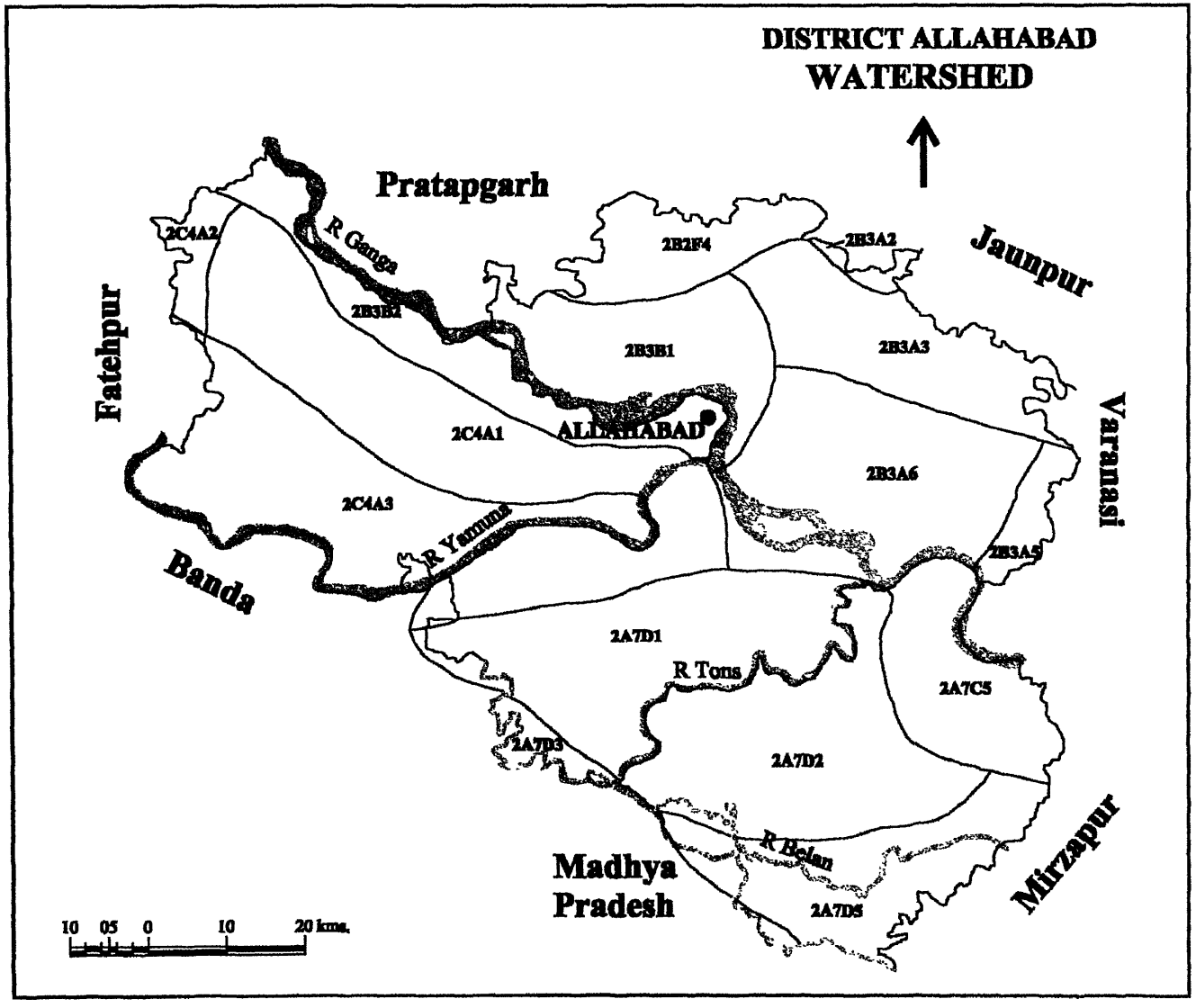

DISTRICT ALLAHABAD
WATERSHED
Pratapgarh
Jaunpur
Fatehpur
Varanasi
Banda
Madhya
Pradesh
Mirzapur
R Ganga
R Yamuna
R Tons
R Belan
ALLAHABAD
2C4A2
2B2F4
2B3A2
2B3B2
2B3B1
2B3A3
2C4A1
2B3A6
2C4A3
2B3A5
2A7D1
2A7C5
2A7D3
2A7D2
2A7D5
10 05 0 10 20 kms.

Fig : 2.4

(ii) The Ganga-Yamuna Doab :

This tracts lies between the Ganga in the north and the Yamuna river in the south. It stretches from the confluence called Sangam in the east and extends towards west. The tahsils of Chail, Manjhanpur and Sirathu represent this geomorphic unit. The Kara block of Sirathu forms the western most boundary in the north-west. This is very rich area in terms of soil. However, the flood banks are marked by high ridges. The gritty soil full of Kankar nodules are found in abundance here. The soils vary from sandy alluvium to loam. The Khadar patches are very narrow and confined only along the river banks.

(iii) The Trans-Yamuna Tract :

Generally referred to as Yamuna-par region, this is represented by the tahsils of Karchhana and Meja. The two tahsils are separated from each other by the Tons river. The Yamuna-par region to a great extent represents a characteristic of Bundelkhand upland. To the south at uplands lie the Vindhyan ranges (RSAC, U.P., 1988). There are several ridges which are quite prominent both in Karchhana and Meja tahsils. There is only a narrow strip of Kachar which is more prominent near the confluence of Ganga and Tons and in the north eastern part of tahsil Meja (District Gazetteer., 1968).

Slope Variation :

Slope provides the most important topographic details as it helps in identifying the environmentally risky and hazardous areas. This is also helpful in decision making process as regards the land utilization and construction activities such as houses, roads, railway lines, bridges and dams etc. This also helps in determining the surface runoff, erosion and ground water movement. In the

present analysis the slope categories in the study area have been determined by using the following formula (NRSA, 1996).

$$\frac{\text{Contour Interval (CI) on the Topomap}}{\text{Distance between the contours}} \times \frac{100}{\text{Scale of Topomap}}$$

Based on this formula the slope analysis of the area under study was done on a map with the R.F. 1:50,000. Four categories of slopes have been identified (see fig. 2.5). These are nearly level, very gently sloping, gently sloping and very steep sloping areas.

The major part of the area is almost level and it covers 91.82 percent of the total area. Gentling sloping area covers less than one percent (0.48 percent); very gently sloping area is also about 2 percent (1.99 percent). The area of very steep slope is again only 0.49 percent. It may be important to mention that the ground morphology of the study area is very ideal for spatial planning. It is a very fertile area suited to production of all kinds of crops. It could be agriculturally one of the richest areas of the country given the proper technology.

Geology :

Geologically and lithologically the area under study presents a monotonous characteristics. It is composed of quaternary alluvia with varying combinations of clay, silt, sand and gravels. The only two remarkable features which are distinctly visible are Khadar and Bangar. The Khadar is composed of renewable alluvial and Bangar represents older alluvial deposits. The thickness and depth of the alluvial deposit in the area under study is not known.

2.4. Soils type and distribution :

This constitutes a very important natural resource base because it helps plants to grow. The cropping pattern, crop productivity and crop efficiency

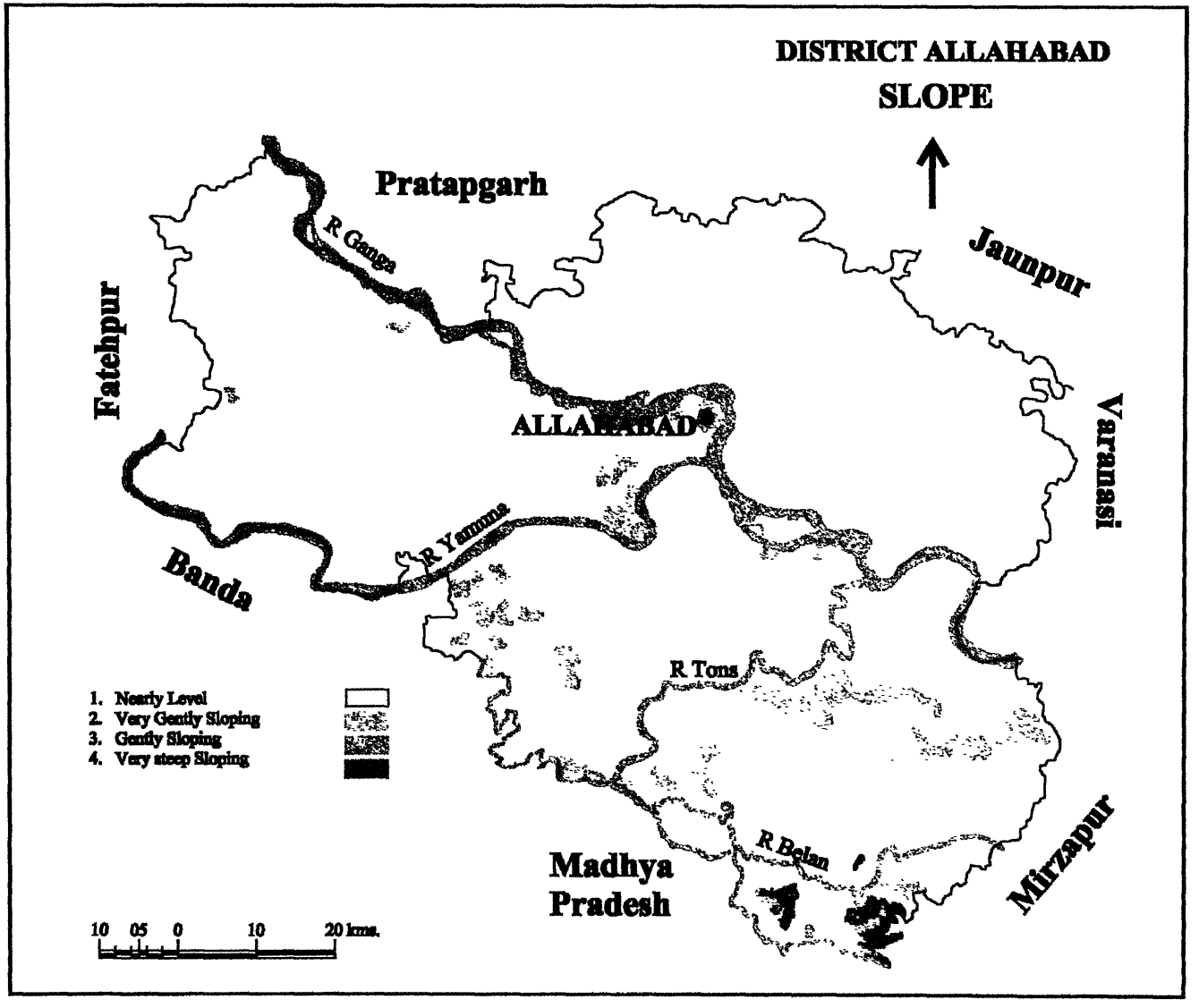

DISTRICT ALLAHABAD
SLOPE
Pratapgarh
R Ganga
Jaunpur
Fatehpur
ALLAHABAD
Varanasi
R Yamuna
Banda
R Tons
1. Nearly Level
2. Very Gently Sloping
3. Gently Sloping
4. Very steep Sloping
R Belan
Madhya Pradesh
Mirzapur
10 05 0 10 20 kms.

Fig : 2.5

largely depend upon the characteristics of soil. It is not exaggerating to say that soil is responsible for civilizations to grow. In the area under study eight categories of soils (see fig. 2.6) have been identified. These are known as (i) Ganga lowland, (ii) Ganga khadar, (iii) Ganga plain, (iv) Ganga upland, (v) Yamuna khadar, (vi) Yamuna plain, (vii) Heavy black and (viii) Khadar lands.

Table : 2.3

DIVISION OF SOIL
DISTRICT ALLAHABAD

Soil Category	Area in Sq. Kms.	Area in Percent
Ganga Lowland	1098.29	15.13
Ganga Khader	870.84	11.99
Ganga Plain	1178.23	16.23
Ganga Upland	715.72	9.86
Yamuna Khader	350.58	4.83
Yamuna Plain	414.29	5.71
Heavy Black	1021.42	14.07
Khader Lands	1232.73	16.98

The table 2.3 shows the distribution pattern of soils under study area. The khadar lands, Ganga plain, Ganga lowland and Ganga khadar occupy the major part of the study area. The Yamuna plain and the Yamuna khadar have only smaller areas. About 14 percent of the area is covered by the heavy black soils which are formed in the trans-Yamuna tracts in 3-4 small patches. There is yet another classifications of soils such as Goind, Kachhiana and Har which is based on local knowledge. This is found near the habitation. The second category of soil which is known as Kachhiana is found close to towns. Such soils are meant for the production of vegetables and fruits. The soils which are found far away from settlements are known as Har (District Gazetteer, 1968). The soils of the study area are seeling through several problems. The basic problems is that of erosion,

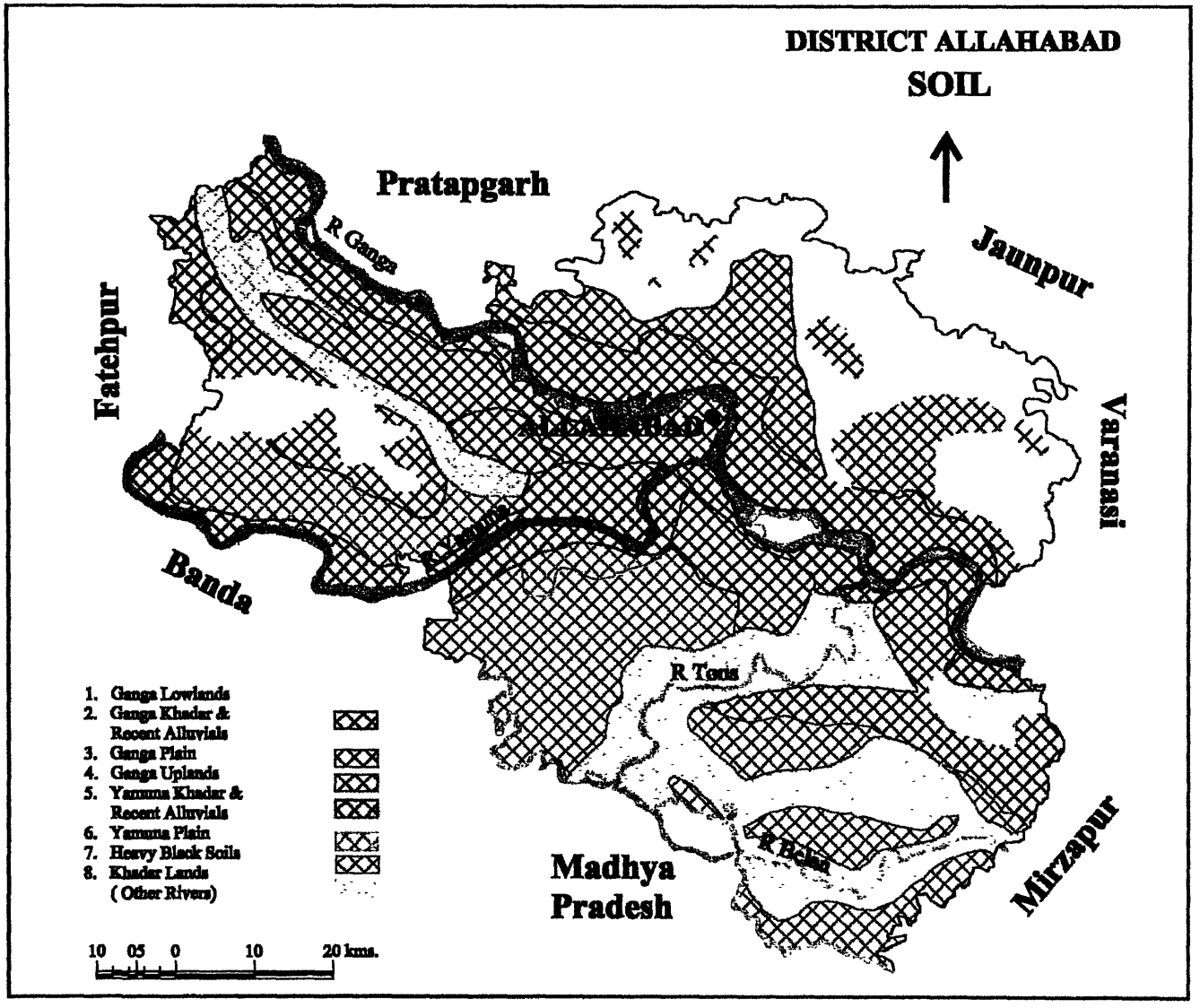

DISTRICT ALLAHABAD
SOIL
Pratapgarh
R Ganga
Jaunpur
Fatehpur
Varanasi
Banda
R Tons
R Belan
Madhya Pradesh
Mirzapur
1. Ganga Lowlands
2. Ganga Khadar & Recent Alluvials
3. Ganga Plain
4. Ganga Uplands
5. Yamuna Khadar & Recent Alluvials
6. Yamuna Plain
7. Heavy Black Soils
8. Khadar Lands (Other Rivers)
10 05 0 10 20 kms.

Fig : 2.6

and soil erosion is quite common in Ganga plain because the soil holding flora is conspicuous by its absence.

2.5. Hydrogeomorphology :

Hydrogeomorphology is basically the combination of geomorphological characteristics and ground water potentials. This is, therefore, significant aspect of environmental planning. The analysis of hydrogeomorphology helps identifying environmental and ecological regions. The hydrogeomorphological map of the area has been prepared by using following data sets :

(i) Survey of India topographical map nos. 63 G, H, K & L on 1:250,000 scale.

(ii) National wasteland project report of Allahabad district, R.S.A.C., U.P.

(iii) IRS-1A, LISS II imagery at P24 R50 of A1, A2, B1, B2.

The study area is divided into ten hydrogeomorphological units (see fig. 2.7). The characteristic of each one of them is as given below :

(i) Flood Plain :

This is the surface of relativity smooth land adjacent to the river Yamuna carved out by the present river in its existing regimen and covered with water when the river overflows its bank. It comprises unconsolidated alluvium. The groundwater prospect is good to very good.

(ii) Younger Alluvial Plain :

Flat to gently undulating plain of limited aerial extent formed by later cycle of river deposition, comprising younger alluvium. The ground water prospect is good to excellent.

(iii) Older Alluvial Plain :

Flat to gently undulating plain of large aerial extent formed by earlier cycle of river deposition consisting of various fluvial land-forms, comprising older alluvium. Groundwater prospect is good to excellent.

(iv) Inter-Fluve of Ganga-Yamuna Rivers :

Flat to gently undulating raised alluvial plain in between the Ganga and the Yamuna rivers, consisting of sand, silt and clay; shallow aquifers may have salinity problem. The ground water prospect is very good, deeper aquifers are free from salinity problem.

(v) Alluvial plain with Salt Encrustation :

Alluvial plain of various time deposition having salt encrustation. Water quality saline in shallow to moderately deep aquifers. The ground water prospect is moderate to good only for very deeper aquifers.

(vi) Ravinous Land :

Small, narrow depressions, smaller than gullies, usually carved by running water. The groundwater prospect is poor to moderate.

(vii) Moderately Weathered Burried Pediplain :

Flat terrain with more than 5-20 m thick overburden. Extensive occurrence of burried pediment forms this unit. The groundwater prospect is poor to moderate and good at inter-section of lineaments.

(viii) Deeply Weathered Burried Pediplain :

Flat terrain with more than 20 m thick over burden. Extensive occurrence of burried pediment forms this unit. The groundwater prospect is moderate to good.

(ix) Dissected Plateau :

Flat to gently sloping landforms with extensive dissection forming level lands alternating with deep valleys. The ground water prospect is poor to moderate.

(x) Back swamp :

The low lying marshy area is a flood plain adjoining natural level. The groundwater prospect is good.

The physiographic characteristics analyzed in this chapter form the basis for socioeconomic analysis in the next chapter.

References :

Dwivedi, R.L., 1960 : *Weather and Climate of Allahabad*, Allahabad : University of Allahabad Studies, 3.

Joshi, E.B., 1968 : *Allahabad District Gazetteer*, Allahabad : Government Press, 4-5, 100.

Misra, H.N., 1984 : *Urban System of a Developing Economy : A Study of Allahabad City-Region*, Allahabad : International Institute for Development Research, 42, 40.

Misra, H.N., 2000 : *Environmental Monitoring and Management of Watersheds in Himalayan Region : A case study of Shirkhad Watershed in Himachal Pradesh*, Project Report, Almora : Govind Ballabh Pant Institute of Himalayan Environment and Development.

National Remote Sensing Agency, 1996 : *Land and Water Resources for Sustainable Development : Shankargarh Block, Allahabad District, U.P.*, A Remote Sensing Based Approach, Hyderabad, 9, 11.

Remote Sensing Applications Centre, uttar Pradesh, 1988 : *Mapping of wastelands, from Satellite Imagery, Uttar Pradesh, Allahabad District*, Lucknow, 6.

Chapter 3

STATE OF SOCIOECONOMIC ENVIRONMENT

The foregoing chapter was devoted to provide an account of the state of physical environment by focussing on climatic characteristic, drainage and watershed, relief and slope, soils and hydrogeomorphological characteristic. The purpose of the present chapter is to analyze the factors of human interaction with nature and thereby focus on parameters which are responsible for bringing the socioeconomic changes. This, thus, attempts to discuss the state of socioeconomic environment in the study area by analyzing the settlement systems, population characteristics and other socioeconomic elements.

3.1. Settlement System :

The settlements are landmarks of the cultural landscape (Hammond, 1979). Almost all the developments whether social or economic are oriented towards the settlements. The settlements are the products of regional economy (Misra, 1984) and regional economy in turn is shaped by human settlements. The number and the size of the settlements in the area under study have varied considerably during 1961-1991. The change in the size and number of the settlements is reflected by the table 3.1. From this table it may be observed that small size settlements such as those which belong to the size category of 0-200 and 200-500 have declined by 32 percent and 22 percent respectively during 1981-1991. The settlements in the size category of 500-2000 and 2000-5000 have increased in number from 1313 and 103 to 1976 and 453 respectively during 1961-1991. The number of settlements in the size category of 5000-10000 has also increased from 1 in 1961 to 14 in 1981 and 35 in 1991. It is interesting that

the total number of settlements has not varied much. In 1961 there were 3526 settlements and over a period of 30 years in 1991 the number of settlements rose

Table : 3.1

GROWTH IN SETTLEMENTS BY POPULATION SIZE
DISTRICT ALLAHABAD, 1961-1991

Growth in Percent

Population Size	1961	1971		1981		1991	
0-200	882	680	-22.90	511	-24.85	348	-31.89
200-499	1227	1105	-9.94	882	-20.18	689	-21.88
500-1999	1313	1566	19.26	1827	16.66	1976	8.15
2000-4999	103	165	60.19	279	69.09	453	62.36
5000-9999	1	1	0.00	14	1300.00	35	150.00
> 10000				1		2	100.00
Total	3526	3522		3514		3539	

SOURCE : District Census Handbook, 1961, 1971, 1981.
Census of India, U.P., 1991.

Table : 3.2

PERCENT OF SETTLEMENTS BY POPULATION SIZE
DISTRICT ALLAHABAD, 1961-1991

Population Size	1961	1971	1981	1991
0-200	25.01	19.30	14.54	9.83
200-499	34.79	31.37	25.09	19.46
500-1999	37.23	44.46	51.99	55.83
2000-4999	2.92	4.68	7.93	12.80
5000-9999	0.02	0.02	0.39	0.98
> 10000			0.02	0.05
Total	100.00	100.00	100.00	100.00

SOURCE : District Census Handbook, 1961, 1971, 1981.
Census of India, U.P., 1991.

to 3539 only. This sliding up in the hierarchy of settlements is further reflected in table 3.2. From this table it may be noted that more than 50 percent population lived in those settlements which belong to the size category of 500-2000. In 1961 only 37 percent population lived in this category at population. The population of settlements belonging to 2000-5000 have also gone up from 2.92 percent in 1961 to 12.8 percent in 1991. The population of the smaller settlements has increased during the last 3 decades and gradually they are moving up in the hierarchy of settlements. This trend is in consonance with the general trend of population living in rural settlements of Uttar Pradesh (see table 3.3). This shows the percentage of villages and percentage of population living in those villages during the decades 1901, 1921, 1951, 1961, 1971, 1981 and 1991.

The area under study has for a long time been dominated by the rural characteristics and there was only one town of some consequence and it was Allahabad. Subsequently several new towns in the form of market centers emerged during 1901-1951 but owing to definitional change the number of towns declined and the towns were declassified as villages. According to 1961 census the definition of town is as under :

(a) All the settlements with the status of town area, notified area, cantonment, municipal board and municipal corporation

or

(b) (i) Those settlements which have population 5000 or more

(ii) The density of population is 400 persons per sq. kms.

(iii) More than 3/4 of the working population should be engaged in non primary activities.

Table : 3.3

PERCENTAGE OF VILLAGES AND INHABITED POPULATION BY POPULATION SIZE, 1901-1991

State/Distt	Year	0-500		500-999		1000-1999		2000-4999		5000-9999		>10000	
		% of Vill	% of Rur. Pop	% of Vill	% of Rur.Pop	% of Vill	% of Rur.Pop	% of Vill	% of Rur.Pop	% of Vill	% of Rur.Pop	% of Vill	% of Rur.Po
U.P.	1901	75.10	37.20	17.10	29.90	6.30	21.80	1.50	10.40	0.00	0.70	0.00	0.00
	1921	76.20	40.30	16.60	30.00	6.00	21.20	1.20	8.10	0.00	0.30	0.00	0.10
	1951	67.50	30.00	20.80	29.80	9.20	25.30	2.40	13.50	0.10	1.40	0.00	0.00
	1961	61.80	24.50	23.10	28.50	11.40	26.90	3.40	16.60	0.30	3.10	0.00	0.40
	1971	55.30	19.20	25.10	26.50	14.30	29.00	4.80	20.00	0.50	4.40	0.00	0.90
	1981	47.30	14.10	26.70	23.60	16.10	30.90	7.20	25.30	0.70	5.20	0.05	0.70
	1991	40.10	9.90	26.20	19.20	21.70	30.90	10.60	30.90	11.20	7.70	0.11	1.50
Allahabad	1901	77.02	43.60	17.00	31.50	5.00	18.40	0.80	5.80	0.00	0.70	0.00	
	1921	78.90	46.50	15.90	31.50	4.70	17.80	0.50	4.20				
	1951	67.10	32.60	22.20	32.50	9.00	25.20	1.60	8.90	0.10	0.80		
	1961	59.80	25.60	25.50	31.40	11.80	28.00	2.90	14.60	0.00	0.40		
	1971	50.60	18.70	29.70	31.00	14.60	29.10	4.00	16.40	0.30	3.00	0.10	1.00
	1981	39.60	11.90	30.80	25.40	21.20	33.83	7.94	25.61	0.40	2.81	0.03	0.37
	1991	30.32	7.32	29.70	19.76	26.14	33.31	12.80	33.33	0.99	5.60	0.06	0.68

SOURCE : Census of India, U.P., 1961-1991.

According to this definition there are 18 towns in the study area. There number and changing size category is presented in table 3.4 and 3.5. The spatial pattern of the distribution of these towns which are the major service centers of the area have been shown in figs. 3.1, 3.2 & 3.3 These towns donot follow the rank size rule (see fig. 3.4). The law of primate city is clearly evident from this graph (Jefferson, 1939, Zipf, 1941). This also reveals the state of developing economy through which the area under study has been passing.

3.2. Population Growth :

The demographic character of population plays significant role in bringing about the changes in the physical environment. Population is key element around which all other elements revolve. "Today's great problem is not so much the size of the world's population - it stands at about 4000 million - but its rate of growth. This is accelerating faster than ever before" (Hammond, 1979). Population of the area under study has been increasing continuously. Since 1951 the trend of population growth in the study area fully conforms with the state of Uttar Pradesh and the country. The population during 1901-1921 declined due to different kinds of disease especially epidemics such as cholera and plague. The year 1921 is known as the period of great divide. In 1931 the population of the study area was 1.49 million which grew to 1.81 million in 1931-1941 recording a growth of 6.2 percent. During 1941-1951 the population increased by 21.5 percent. It, thus, grew from 1.81 million in 1941 to 2.04 million in 1951. During the last four decades (1951-1991) the population of the study area has more than doubled as it grew from 2.04 million in 1951 to 4.92 million in 1991. Interestingly the population of Uttar Pradesh and India during these decades has also increased in

Table : 3.4

DISTRIBUTION OF URBAN SETTLEMENTS BY POPULATION SIZE DISTRICT ALLAHABAD, 1901-1991

Population Size	1901	1951	1961	1971	1981	1991
> 100000	1	1	1	1	1	1
50000-99999						
20000-49999						
10000-19999					3	9
5000-9999	2	2	2	4	11	7
< 5000	10	6			2	

Source : Misra, H.N., Urban System of a Developing Economy.
I.I.D.R., 1984.
District Statistical Bulletin, 1997.

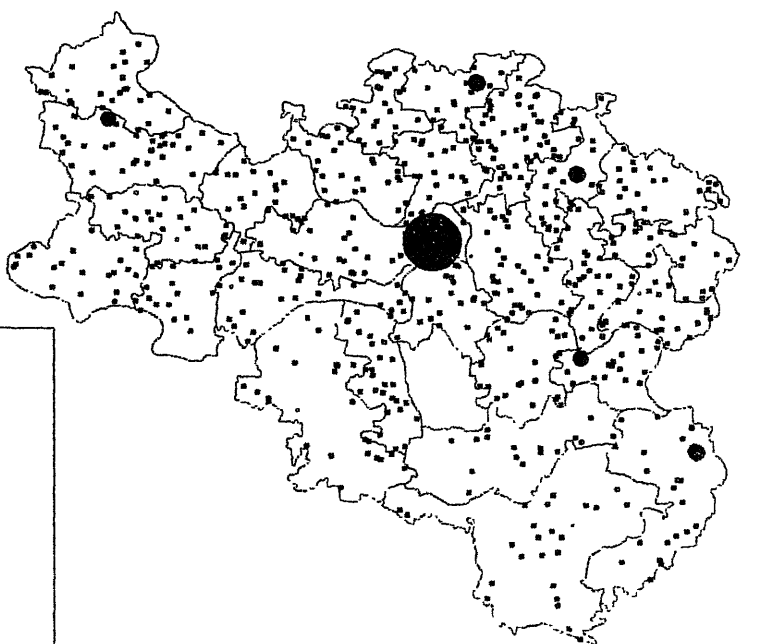
Table : 3.5

NUMBER OF TOWNS OF EACH CLASS DISTRICT ALLAHABAD, 1901-1991

Class	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991
Class I	1	1	1	1	1	1	1	1	1	1
Class II	-	-	1	-	-	-	-	-	-	-
Class III	-	-	-	-	-	-	-	-	-	-
Class IV	-	-	-	-	-	-	-	-	3	9
Class V	2	2	2	1	2	2	2	4	10	7
Class VI	4	3	5	5	4	5	-	-	2	-
Total	7	6	9	7	7	8	3	5	16	17

SOURCE : Census of India, U.P., 1991.

DISTRIBUTION OF POPULATION
DISTRICT ALLAHABAD, 1971



Distribution of Rural Population

1 Dot = 3,800

Distribution of Urban Population

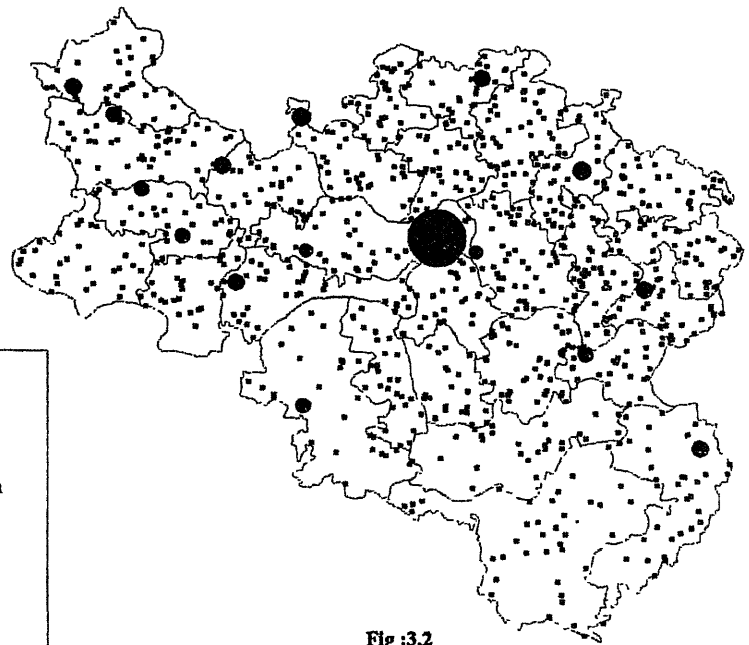
520,000

260,000

52,000

Fig : 3.1

DISTRIBUTION OF POPULATION
DISTRICT ALLAHABAD, 1981



Distribution of Rural Population

1 Dot = 3,300

Distribution of Urban Population

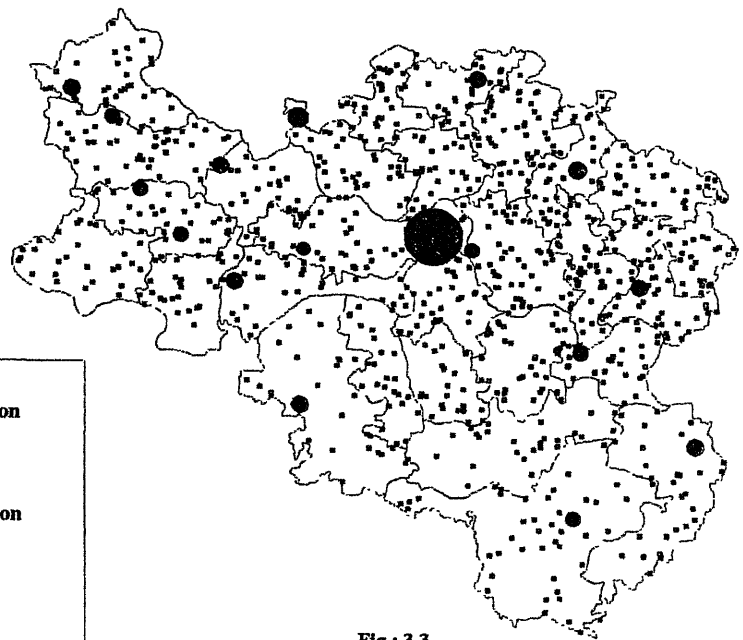
650,000

325,000

65,000

Fig :3.2

DISTRIBUTION OF POPULATION
DISTRICT ALLAHABAD, 1991



Distribution of Rural Population

1 Dot = 4,200

Distribution of Urban Population

850,000

425,000

85,000

Fig : 3.3

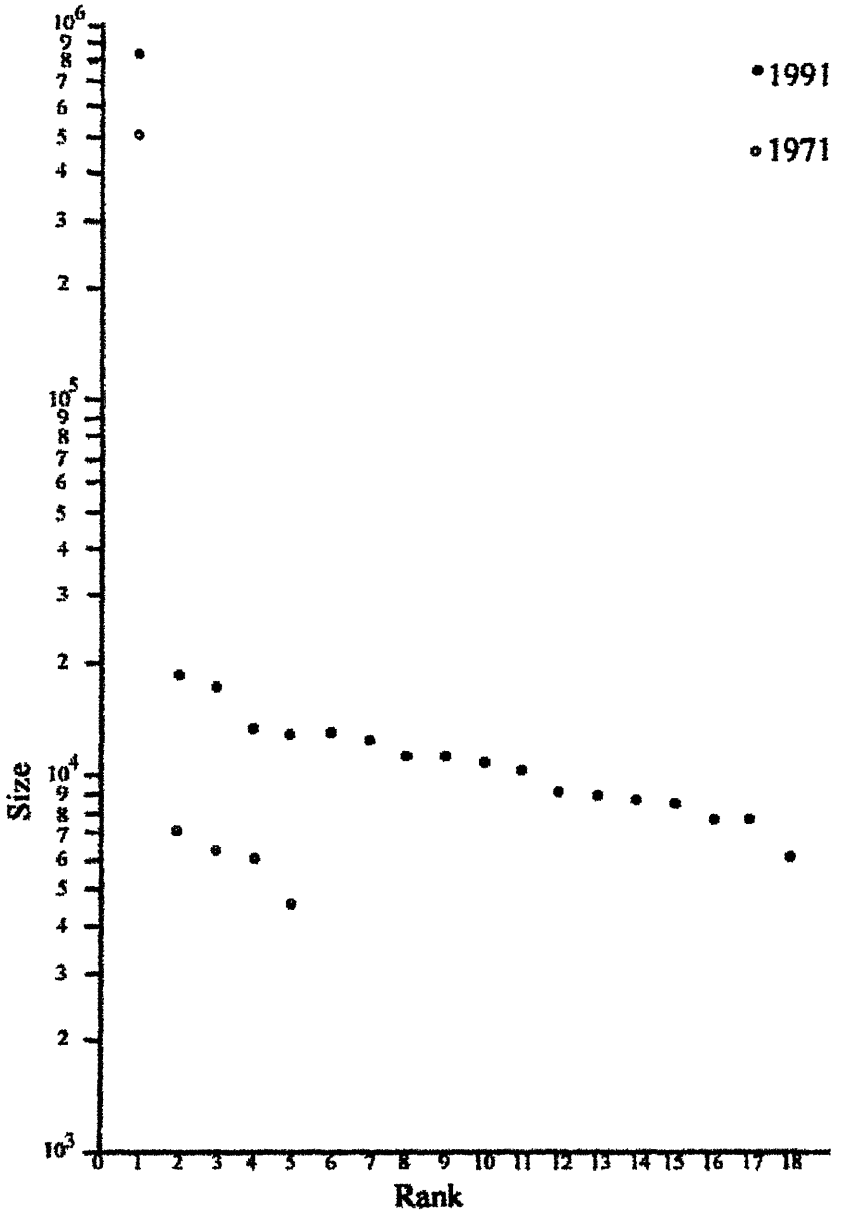


Fig : 3.4 SHOWING RANK SIZE RELATIONSHIP

the same manner (see table 3.6 and figs. 3.5 & 3.6). The growing population has been putting additional pressure on the natural resources of the area under study.

The rural and urban population have also followed the general trend of the population growth. In fact the urban population has increased more rapidly than the rural population which is evident from the table 3.7 and figs. 3.7 & 3.8. The urban population during 1971-1981 and 1981-1991 registered the increase by 42.7 percent and 32.2 percent respectively. The existing urban centers like Allahabad, Mauaima, Phulpur, Sirsa and Bharatganj have registered growth in their respective population. Several new urban centers like Kara, Sirathu and Manikpur etc. have also emerged. The growth of population in urban areas has aggravated several socioeconomic problems which relate to employment, housing, public utility services and other infrastructural facilities. A comparative picture of growth of population during the last two decades and the growth of rural population at block level in the year 1971, 1981 and 1991 has also been shown (see fig. 3.9).

3.3. Age and Sex Structure :

The age and sex structure of the population which has been presented in table 3.8 shows that most of the population lies in the age group of 0-14 and 15-59. The age group 0-14 represents the young population and the age group of 15-59 represents adult population. According to 1991 census 41.5 percent people (22.4 percent male and 19.1 percent female) belonged to the age group 0-14 and 53.3 percent (28.3 percent male and 25.0 percent female) were in the age group 15-59. Only 5.2% population belong to the category of old age group (60+). This predominant adult characteristics of population explains the rising trend of population. The population is likely to increase even in future with these

Table : 3.6

COMPARITIVE POPULATION GROWTH,1901-1991

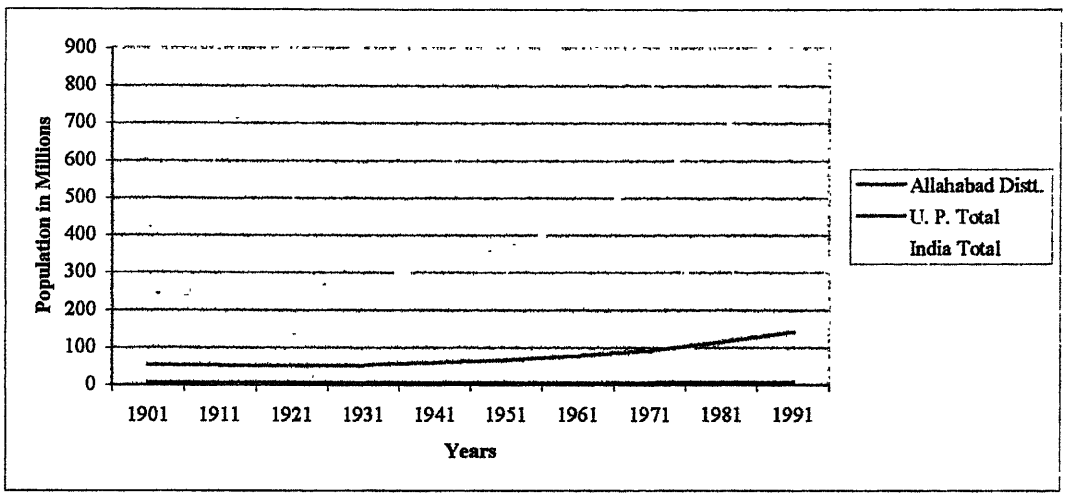
Population in Million

Growth Rate in Percent [In Bracket]

Census Year	Allahabad Total	U. P. Total	India Total
1901	1.49	48.62	238.30
1911	1.46	48.15	252.00
	[-1.6]	[-1.0]	[5.8]
1921	1.40	46.67	251.30
	[-4.3]	[-3.1]	[-0.3]
1931	1.49	49.77	278.90
	[6.2]	[6.7]	[11.0]
1941	1.81	56.53	318.60
	[21.5]	[13.6]	[14.2]
1951	2.04	63.21	361.00
	[13.0]	[11.8]	[13.3]
1961	2.43	73.75	439.20
	[19.3]	[16.7]	[21.5]
1971	2.93	88.34	548.10
	[20.5]	[19.8]	[24.1]
1981	3.79	110.86	685.00
	[29.3]	[25.5]	[24.7]
1991	4.92	139.11	843.90
	[29.6]	[25.5]	[23.5]

SOURCE : Census of India, 1901-1981.
Census of India, U.P., 1991.

COMPARATIVE POPULATION GROWTH, 1901-1991



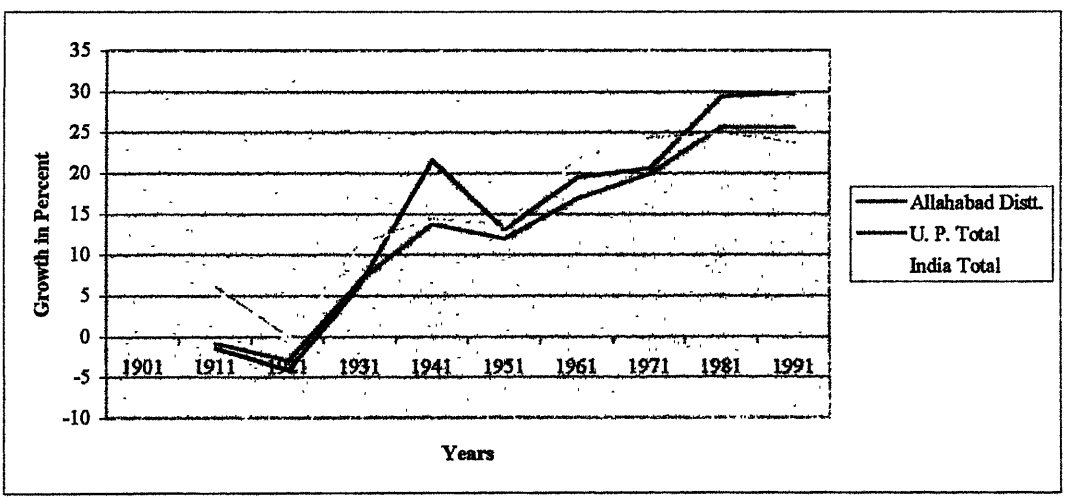
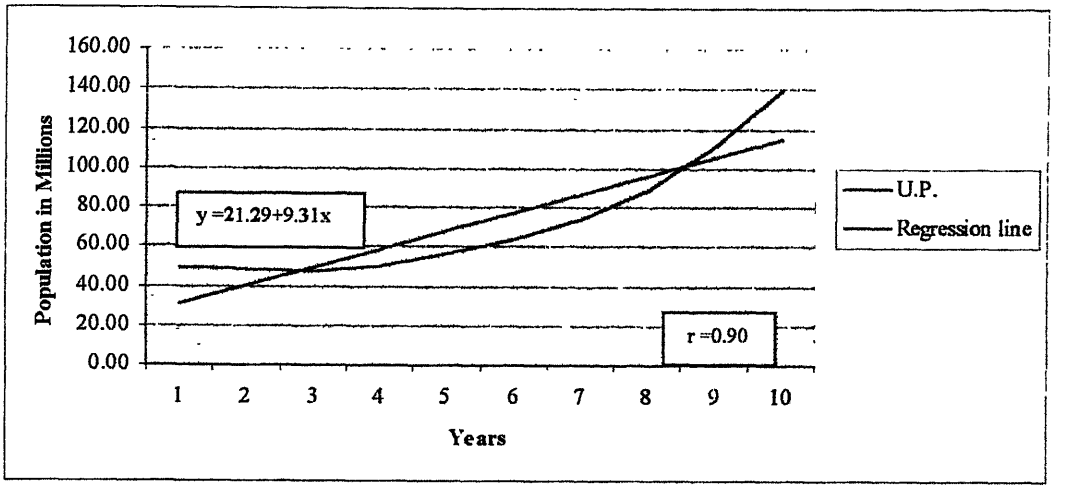


Fig : 3.5

POPULATION IN UP & DISTRICT ALLAHABAD, 1991-1991



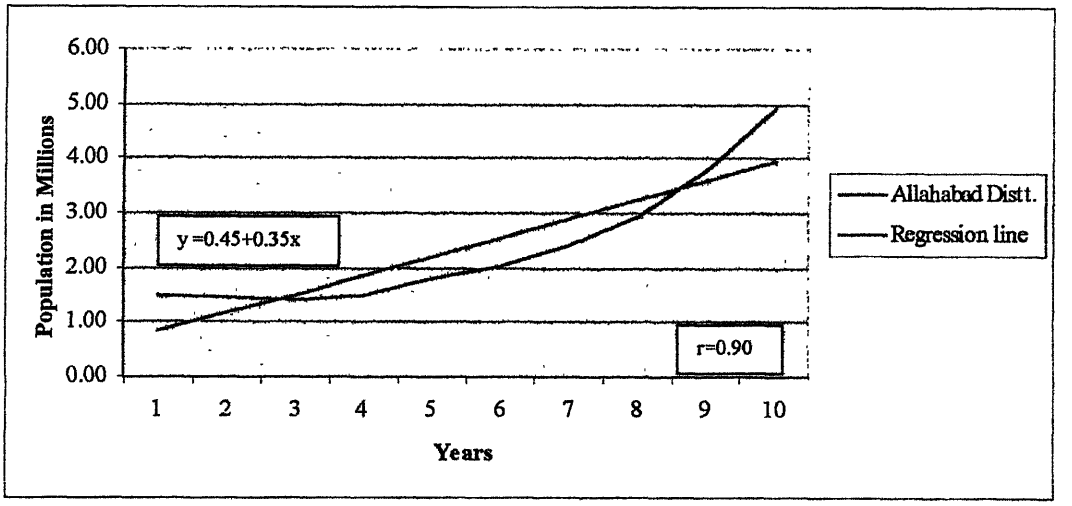


Fig : 3.6

Table : 3.7

POPULATION GROWTH IN RURAL & URBAN AREAS DISTRICT ALLAHABAD, 1901-1991

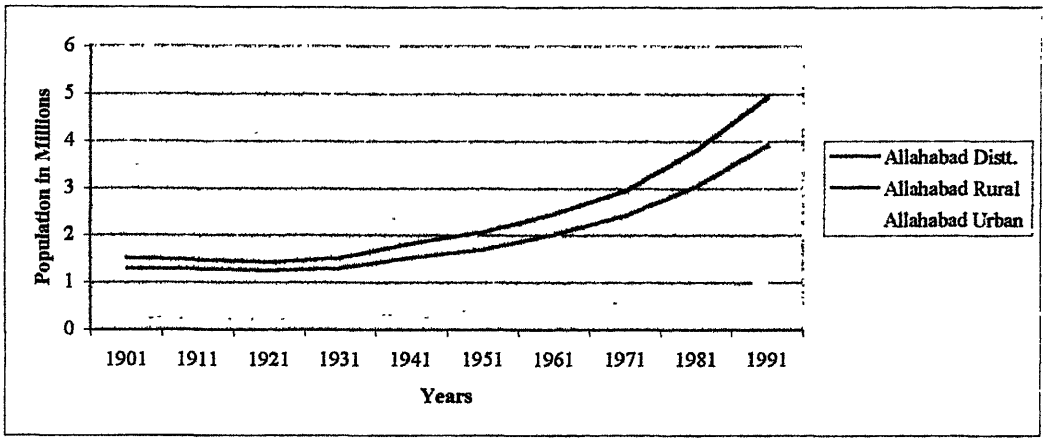
Population in Million
Growth Rate in Percent [In Bracket]

Census Year	Allahabad Rural	Allahabad Urban
1901	1.27	0.21
1911	1.26	0.20
	[-0.4]	[-7.6]
1921	1.21	0.18
	[-3.9]	[-6.9]
1931	1.27	0.21
	[4.9]	[14.6]
1941	1.50	0.29
	[18.4]	[39.8]
1951	1.67	0.36
	[11.2]	[22.3]
1961	1.99	0.44
	[18.9]	[21.3]
1971	2.39	0.54
	[20.1]	[22.1]
1981	3.02	0.77
	[26.2]	[42.7]
1991	3.89	1.02
	[29.1]	[32.2]

SOURCE : Census of India, 1901-1981.
Census of India, U.P., 1991.

COMPARATIVE POPULATION GROWTH

DISTRICT ALLAHABAD, 1901-1991



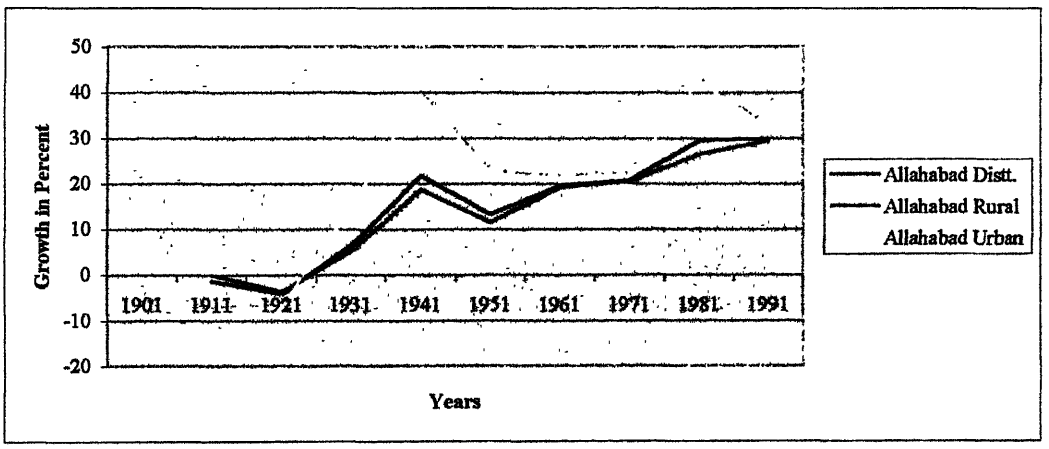
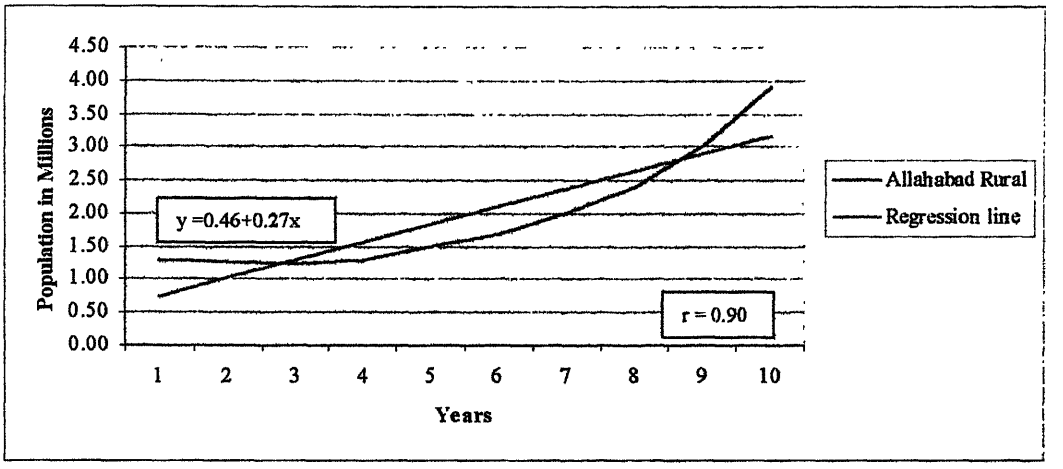


Fig : 3.7

POPULATION IN RURAL & URBAN AREAS

DISTRICT ALLAHABAD, 1901-1991



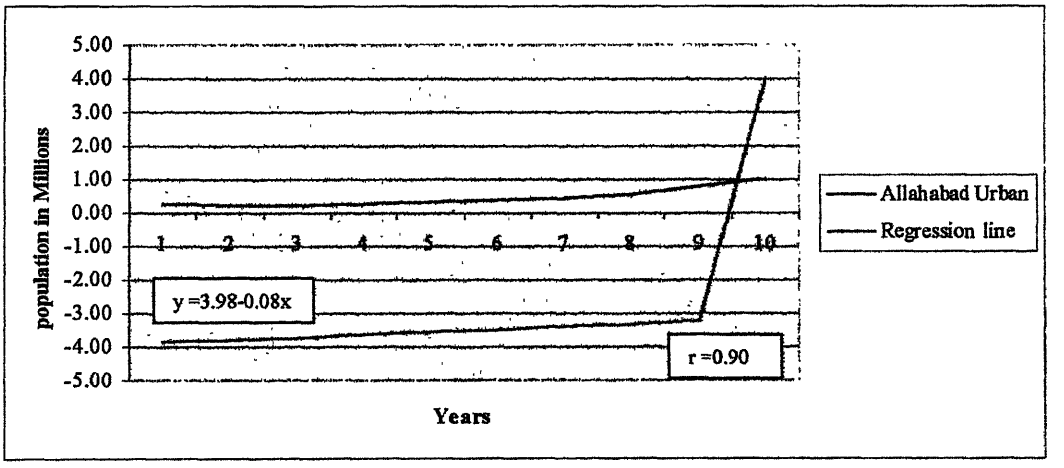
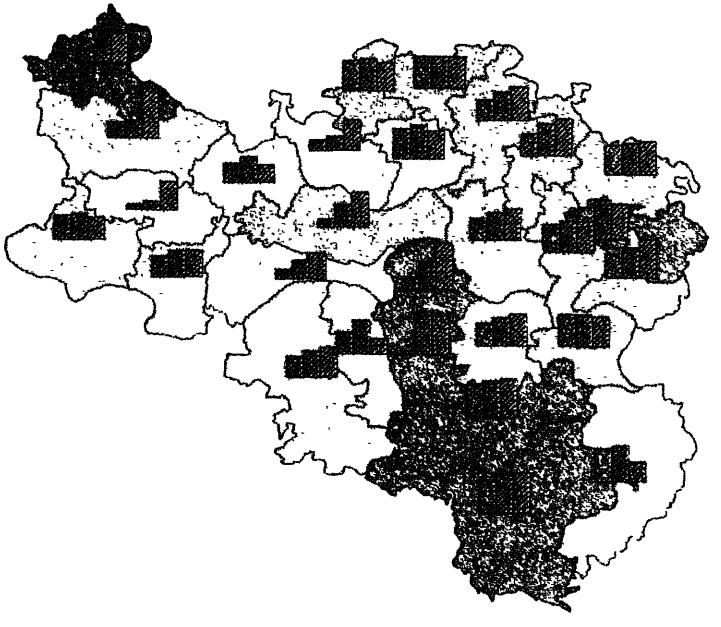


Fig : 3.8

GROWTH OF POPULATION IN RURAL AREAS
DISTRICT ALLAHABAD



Growth of Rural Population 1971-1991 [In Percent]

- Below 31.7
- 31.7 to 46.4
- 46.4 to 61.1
- 61.1 to 75.8
- Above 75.8

Growth of Rural Population 1971,1981,1991 [In Percent]

- 1971
- 1981
- 1991

Fig : 3.9

attributes because the age-sex structure shows the expanding characteristics (Haggett, 1975).

Table : 3.8

AGE & SEX STRUCTURE [IN PERCENT]
DISTRICT ALLAHABAD, 1971-1991

Age Structure	Male	Female 1971	Total	Male	Female 1981	Total	Male	Female 1991	Total
0-14	22.9	20.3	43.2	22.0	19.9	41.9	22.4	19.1	41.5
15-59	20.5	24.1	50.6	27.5	24.6	52.1	28.3	25.0	53.3
60 & Above	3.4	2.8	6.2	3.3	2.7	6.0	3.1	2.1	5.2

SOURCE : District Census, Allahabad, 1971, 1981.
District Statistical Bulletin, 1997.

3.4. Sex Ratio :

Sex ratio is number of females per 1000 males. The high sex ratio explains the migration of males. The sex ratio of the study area at the district level and block level has been presented in tables 3.9, 3.10, 3.11 & 3.12. From the table it is evident that the sex ratio has declined in absolute terms and also at block level. This is indicative of increased mortality among the infant females. Even though the ratio of mortality in general has improved considerably, the female children do not get adequate attention that they deserve in rural areas. The total and rural sex ratios for 1971, 1981 and 1991 have been shown in fig. 3.10. The distribution of sex ratio appears to be uniform. There are only two variations which are visible- one in the central part of the study area and the other in the south eastern part. These two areas have comparably lower sex ratio. It is, however, difficult to attribute causes for this variation.

Table : 3.9

SEX RATIO [NO. OF FEMALE / 1000 MALE], 1901-1991

Year	District	State	India
1901	1001	937	
1911	971	915	
1921	943	909	
1931	945	904	950
1941	953	907	945
1951	946	910	946
1961	929	919	941
1971	898	879	930
1981	890	885	933
1991	875	879	929

SOURCE : District Census, Allahabad, 1951-1981.
Census of India, U.P., 1991.

Table : 3.10

SEX RATIO [NO. OF FEMALE / 1000 MALE]
DISTRICT ALLAHABAD, 1901-1991

Year	Total	Rural	Urban
1901	1001	1017	907
1911	971	1001	801
1921	943	973	783
1931	945	974	986
1941	953	993	776
1951	946	979	808
1961	929	965	783
1971	898	925	790
1981	890	909	822
1991	875	822	821

SOURCE : Census of India, U.P., 1991.

Table : 3.11

TOTAL SEX RATIO [NO. OF FEMALE / 1000 MALE] DISTRICT ALLAHABAD, 1981-1991

Dev. Block	1981	1991
Kara	917	897
Sirathu	905	898
Sarsawan	896	895
Manjhanpur	948	902
Kaushambi	927	548
Muratganj	873	868
Chail	865	823
Nevada	887	867
Kaurihar	911	898
Holagarh	957	947
Mauaima	943	923
Soraon	907	891
Baharia	938	917
Phulpur	929	912
Bahadurpur	882	868
Pratappur	938	943
Saidabad	912	900
Dhanupur	929	918
Handia	920	893
Jasra	888	859
Shankargarh	894	873
Chaka	839	841
Karchhana	892	860
Kaudhiyara	812	872
Uruwan	932	902
Meja	886	868
Koraon	907	867
Manda	901	828
Total	890	875

SOURCE : District Statistical Bulletin, 1987, 1997.

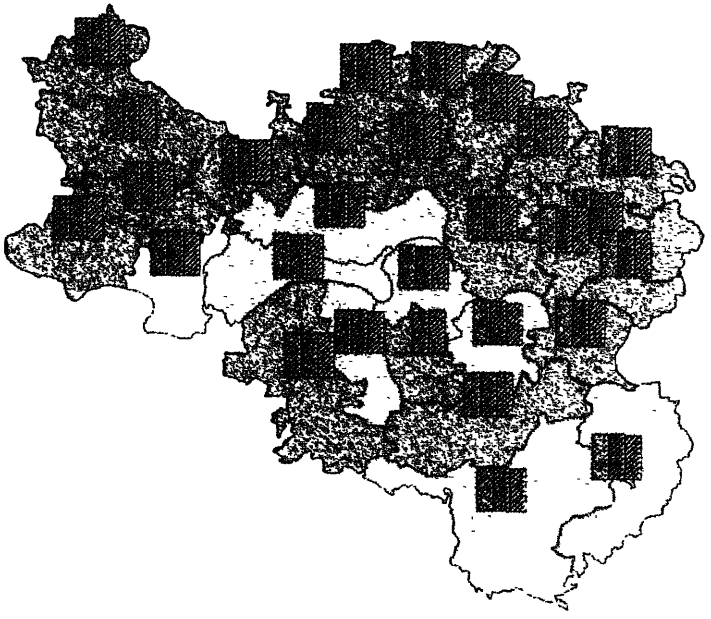
Table : 3.12

SEX RATIO IN RURAL AREAS [NO. OF FEMALE / 1000 MALE] DISTRICT ALLAHABAD, 1961-1991

Dev. Block	1961	1971	1981	1991
Kara	953	929	919	897
Sirathu	941	819	909	891
Sarsawan	923	892	896	895
Manjhanpur	936	937	942	903
Kaushambi	950	923	927	895
Muratganj	955	937	875	870
Chail	944	886	820	840
Nevada	959	924	887	867
Kaurihar	966	939	912	897
Holagarh	1004	969	957	947
Mauaima	1022	941	947	926
Soraon	937	907	907	891
Baharia	988	949	938	917
Phulpur	1002	951	937	918
Bahadurpur	948	889	883	876
Pratappur	1050	973	938	943
Saidabad	1015	941	912	900
Dhanupur	1011	986	919	918
Handia	998	960	929	899
Jasra	946	888	888	859
Shankargarh	927	886	894	878
Chaka	936	896	839	841
Karchhana	911	904	892	860
Kaudhiyara			812	872
Uruwan	993	958	934	907
Meja	928	891	894	868
Koraon	938	909	907	869
Manda	956	928	902	898
Total	965	925	909	889

SOURCE : District Census Handbook, 1961-1981.
District Statistical Bulletin, 1997.

SEX RATIO
DISTRICT ALLAHABAD



Total Sex Ratio
1991

- Below 628
- 788 to 868
- Above 868

Rural Sex Ratio
1971-1991

990

- 1971
- 1981
- 1991

Fig : 3.10

3.5. Population Distribution :

The distribution of rural-urban population for last three decades has been shown in figs. 3.1, 3.2, 3.3. These maps show increasing concentration of population in an uniform manner in the entire area. The concentration is heavier in and around the urban settlements. The absolute density of the population in the study area has increased by more than three times during 1901-1991. In 1901 the density was 203 persons/km^2 but during the last nine decades it has risen to 678 persons/km^2. (see table 3.13). A perusal of the density of total population (see table 3.14) shows that the blocks of Chail, Mauaima, Soraon, Handia have very high density of population due to location of urban centers.

Table : 3.13

COMPARITIVE DENSITY OF POPULATION, 1901-1991

[Density Per sq. Km.]

Census Year	Allahabad	U. P.	India
1901	203	165	77
1911	200	164	82
1921	55	159	81
1931	202	169	90
1941	251	192	103
1951	283	215	117
1961	327	251	142
1971	405	300	177
1981	523	377	216
1991	678	473	274

SOURCE : U.P. District Gazetteer, Allahabad,1968.
Dictrict Statistical Bulletin, 1977,1987,1997.
Statistical Dairy, 1997.

The density of total population vis-a-vis rural population has been shown in fig. 3.11. From this figure it may be clearly seen that the trans-Yamuna region has lesser density as compared to doab and trans-Ganga tract. This is because the

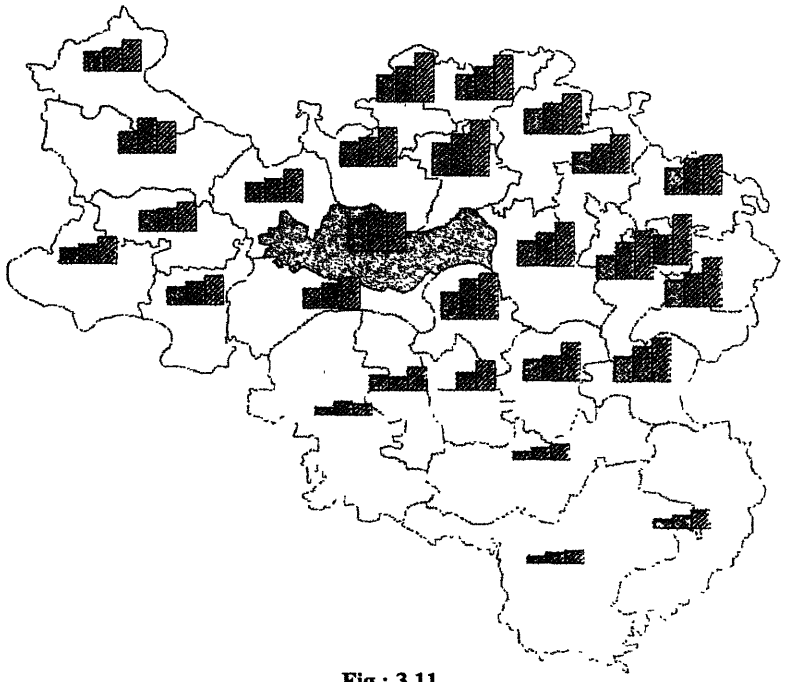
Table : 3.14

DENSITY OF TOTAL POPULATION [PER SQ. KMS.] DISTRICT ALLAHABAD, 1971-1991

Dev. Block	1971	1981	1991
Kara	350	453	541
Sirathu	361	459	585
Sarsawan	283	356	465
Manjhanpur	365	425	606
Kaushambi	323	406	563
Muratganj	339	457	633
Chail	2338	3691	3057
Nevada	339	477	542
Kaurihar	439	586	725
Holagarh	477	620	846
Mauaima	482	639	1183
Soraon	575	871	988
Baharia	443	563	728
Phulpur	416	533	731
Bahadurpur	459	619	813
Pratappur	489	632	732
Saidabad	509	662	841
Dhanupur	375	512	874
Handia	462	654	909
Jasra	285	253	417
Shankargarh	144	203	243
Chaka	470	700	829
Karchhana	371	429	666
Kaudhiyara		315	495
Uruwan	491	636	823
Meja	142	191	262
Koraon	144	196	262
Manda	192	260	371
Total	405	523	678

SOURCE : District Statistical Bulletin, 1977, 1987, 1997.

DENSITY OF POPULATION
DISTRICT ALLAHABAD



Density of Total Population 1991 [Persons/Sq Km]

- Below 800
- 800 to 1360
- Above 2480

Density of Rural Population 1971-1991 [Persons/Sq Km]

990

- 1971
- 1981
- 1991

Fig : 3.11

Table : 3.15

DENSITY OF POPULATION IN RURAL AREAS [PER SQ. KMS.] DISTRICT ALLAHABAD, 1971-1991

Dev. Block	1971	1981	1991
Kara	350	407	541
Sirathu	361	600	560
Sarsawan	283	356	465
Manjhanpur	365	394	525
Kaushambi	323	406	514
Muratganj	339	404	584
Chail	572	721	684
Nevada	339	433	542
Kaurihar	439	500	677
Holagarh	477	620	846
Mauaima	447	582	782
Soraon	575	754	988
Baharia	443	563	728
Phulpur	382	496	666
Bahadurpur	459	578	786
Pratappur	489	632	732
Saidabad	409	662	841
Dhanupur	375	512	874
Handia	462	589	859
Jasra	285	253	417
Shankargarh	144	223	221
Chaka	470	709	829
Karchhana	371	429	666
Kaudhiyara		315	495
Uruwan	459	598	778
Meja	142	191	262
Koraon	144	196	249
Manda	178	238	338
Total	334	422	548

SOURCE : District Statistical Bulletin, 1977, 1987, 1997.

trans-Yamuna tract and upland area do not have very fertile soil. The pressure of population in the fertile belts of doab and trans-Ganga tract has been on rise as is evident from this map. The blocks with urban population have higher density of population as compared to those blocks which are absolutely rural. The urban population helps swell the density at the block level. This, however, reflects the increasing pressure of population on the resources. (see table 3.15).

3.6. Occupational Structure :

The occupational structure explains the livelihood pattern as well as the economic base of the people and the area under study. The population is usually divided into workers and non-workers. There are two types of workers-main workers and marginal workers. Main workers are those who are engaged in some kind of productive work at least 183 days of the year and marginal workers are those who are in gainful employment only for few months i.e. for less than 183 days. Non-workers are those who are not in any gainful or productive employment.

A comparative picture of workers and non-workers at block level during 1981 and 1991 has been presented in table 3.16. From this table it is clear that the main workers by and large constitute only 1/3 of the total population. Even though percentage of main workers appears to have slightly improved during 1981-1991, the percentage of marginal workers has invariably increased in all the blocks of the district. (see fig. 3.12 & 3.13).

The workers are grouped into three categories-primary, secondary and tertiary. The primary workers are those who are cultivators, agricultural labourers and are engaged in animal husbandry, live stock farming and mining activity. The secondary workers are those who are engaged in household industry,

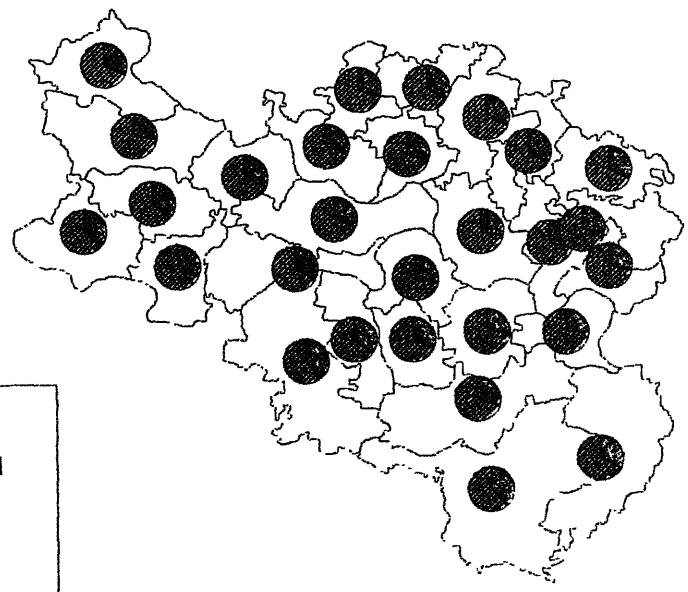
Table : 3.16

DISTRIBUTION OF POPULATION AMONG DIFFERENT OCCUPATIONAL CATEGORIES, DISTRICT ALLAHABAD, 1981-1991
[% OF TOTAL POPULATION]

Dev. Block	Main Worker		Marginal Worker		Non Worker	
	81	91	81	91	81	91
Kara	29.9	30.8	1.7	5.6	68.4	63.6
Sirathu	25.5	34.9	2.1	5.4	72.4	59.7
Sarsawan	35.0	41.0	1.0	8.2	64.0	50.8
Manjhanpur	34.0	40.1	2.0	4.9	64.0	55.0
Kaushambi	38.0	30.0	0.6	4.5	61.4	65.5
Muratganj	30.6	35.0	0.4	3.1	69.0	61.9
Chail	30.2	32.6	1.0	0.5	68.8	66.9
Nevada	31.9	36.6	0.1	0.7	68.0	62.7
Kaurihar	31.0	33.6	0.4	1.2	68.6	65.2
Holagarh	30.0	33.1	0.1	1.6	69.9	65.3
Mauaima	32.2	31.8	1.2	3.1	66.6	65.1
Soraon	28.6	31.1	0.6	1.4	70.8	67.5
Baharia	29.3	32.3	0.8	4.5	69.9	63.2
Phulpur	32.7	33.1	1.4	4.2	65.9	62.7
Bahadurpur	27.7	29.5	0.4	1.5	71.9	69.0
Pratappur	32.0	33.0	0.4	2.8	67.6	64.2
Saidabad	28.0	28.8	0.9	2.7	71.1	68.5
Dhanupur	27.6	30.7	0.8	2.3	71.6	67.0
Handia	27.5	29.3	0.3	1.7	72.2	69.0
Jasra	33.8	35.8	0.9	2.3	65.3	61.9
Shankargarh	39.1	40.0	0.8	2.2	60.1	57.8
Chaka	28.8	30.8	0.3	0.8	70.9	68.4
Karchhana	26.2	29.9	0.2	1.1	73.6	69.0
Kaudhiyara	30.7	32.9	0.9	2.3	68.4	64.8
Uruwan	25.6	28.1	0.3	0.9	74.1	71.0
Meja	29.5	32.1	0.6	2.9	69.9	65.0
Koraon	37.0	38.5	1.2	1.6	61.8	59.9
Manda	32.1	31.0	0.6	2.5	67.3	66.5
Total Rural	30.5	33.2	0.8	2.7	68.7	64.1
Total Urban	26.1	25.3	0.1	0.5	73.8	74.2
Total District	29.6	31.5	0.6	5.7	69.8	62.8

SOURCE : District Statistical Bulletin, 1987, 1997.

OCCUPATIONAL STRUCTURE IN RURAL AREAS
DISTRICT ALLAHABAD, 1981



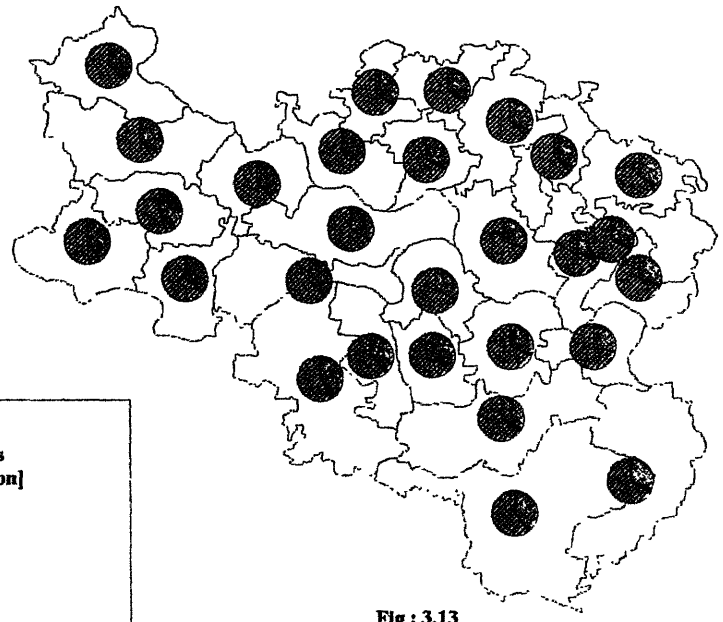
Occupational Categories
[Percent of Total Population]

100
50
10

Main Worker
Marginal Worker
Non Worker

Fig : 3.12

OCCUPATIONAL STRUCTURE IN RURAL AREAS
DISTRICT ALLAHABAD, 1991



Occupational Categories
[Percent of Total Population]

100
50
10

Main Worker
Marginal Worker
Non Worker

Fig : 3.13

manufacturing and construction work. The tertiary workers are those who are dependent on commerce and trade, transport and communications and other services. The structural change and diversification in the economic activity displays the economic progress of a region. A perusal of the table which shows the blockwise percentage of primary, secondary and tertiary workers for the two decades (1981 & 1991) indicates that the structural change and diversification is very slow. The primary workers continue to dominate. The secondary activities have not progressed. Of course, the tertiary activities are gaining prominence. Among the tertiary activities the other services are very important. (see table 3.17 & fig. 3.14 & 3.15). According to 1991 data the range of primary workers varies between 60-94 percent. The secondary workers vary between 1-21 percent and tertiary workers vary between 4-20 percent. The development blocks have not displayed any specific trend in the occupational activity during 1981 and 1991.

A breakup of the occupational structure in all the ten categories has been presented for 1981 and 1991 for a comparative perspective. From the tables 3.18 & 3.19 it is evident that animal husbandry, mining and construction activities are not of any great consequence. The percentage of workers in all these categories at block level is less than one. Shankargarh is the only block where mining activity has registered significant progress during the last decade (1981-1991). In 1991 there were 8 percent workers who earned their livelihood from mining activity. Contrary to the rural situation, the urban areas have very small segment of population dependent upon the primary activity. There were only 10 percent people who were involved in primary activity. The secondary activity in urban areas has declined from 22 percent to 18 percent. The trade and commerce has, however, gone up from 15 percent to 26 percent during 1981-1991. But the trade

Table : 3.17

DISTRIBUTION OF POPULATION AMONG DIFFERENT OCCUPATIONAL CATEGORIES, DISTRICT ALLAHABAD, 1981-1991
[% OF MAIN WORKERS]

Dev. Block	Primary		Secondary		Tertiary	
	81	91	81	91	81	91
Kara	85.66	82.65	6.22	4.25	8.11	13.09
Sirathu	85.33	89.10	5.81	3.53	8.85	7.35
Sarsawan	92.61	94.07	3.40	1.29	3.98	4.62
Manjhanpur	92.78	93.34	4.90	1.68	2.30	4.98
Kaushambi	95.00	94.05	2.73	1.04	2.25	4.90
Muratganj	78.22	85.32	11.10	3.08	10.67	11.59
Chail	81.00	77.54	4.53	3.77	14.46	18.68
Nevada	90.83	92.60	4.78	1.84	4.39	5.55
Kaurihar	88.22	84.87	6.41	2.47	5.36	12.64
Holagarh	93.50	85.91	2.01	3.54	4.48	10.54
Mauaima	84.56	79.52	6.55	6.57	8.88	13.90
Soraon	77.06	75.30	10.53	7.07	12.40	17.62
Baharia	85.35	83.76	4.27	6.02	10.37	10.21
Phulpur	72.78	79.59	9.18	11.03	18.04	9.38
Bahadurpur	72.47	69.18	9.15	13.54	18.37	17.27
Pratappur	70.98	80.11	17.32	9.89	11.69	9.99
Saidabad	78.88	70.09	10.87	16.19	10.25	13.71
Dhanupur	68.93	70.49	20.51	21.58	10.54	7.92
Handia	65.08	75.04	28.86	15.63	6.06	9.33
Jasra	79.70	81.36	12.49	5.95	7.80	12.68
Shankargarh	81.72	91.06	8.49	2.48	9.78	6.45
Chaka	65.19	60.75	16.75	19.12	18.05	20.12
Karchhana	81.94	77.84	12.14	8.38	5.91	13.76
Kaudhiyara	78.04	82.95	17.24	10.55	4.71	6.49
Uruwan	76.09	76.03	13.41	10.01	10.49	13.95
Meja	90.35	84.50	6.14	7.07	3.50	8.42
Koraon	87.86	92.71	7.67	3.15	4.46	4.13
Manda	79.94	79.50	11.89	10.02	8.17	10.47
Total Rural	80.37	81.68	9.51	7.35	10.11	10.96
Total Urban	11.45	10.21	22.32	17.90	66.22	71.89
Total District	68.07	69.75	11.8	9.11	20.12	21.13

SOURCE : District Statistical Bulletin, 1987, 1997.

OCCUPATIONAL STRUCTURE IN RURAL AREAS
DISTRICT ALLAHABAD, 1981

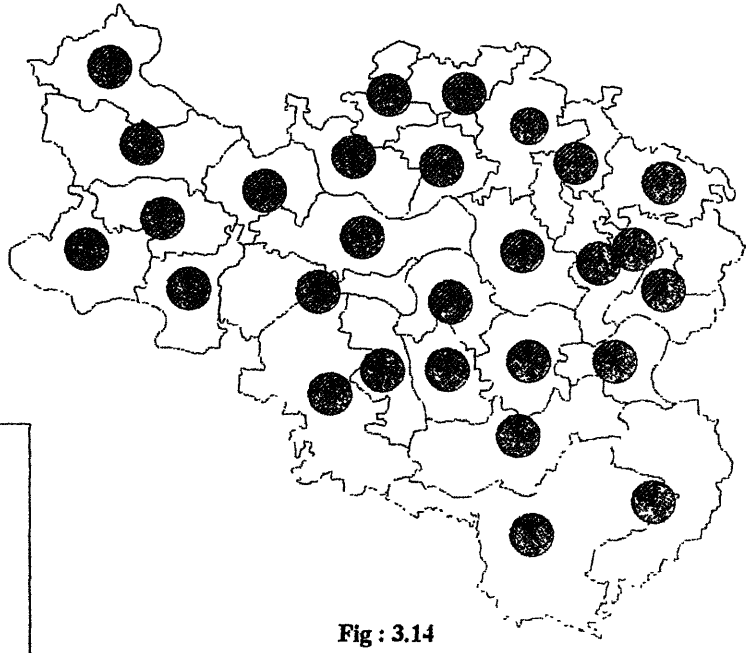
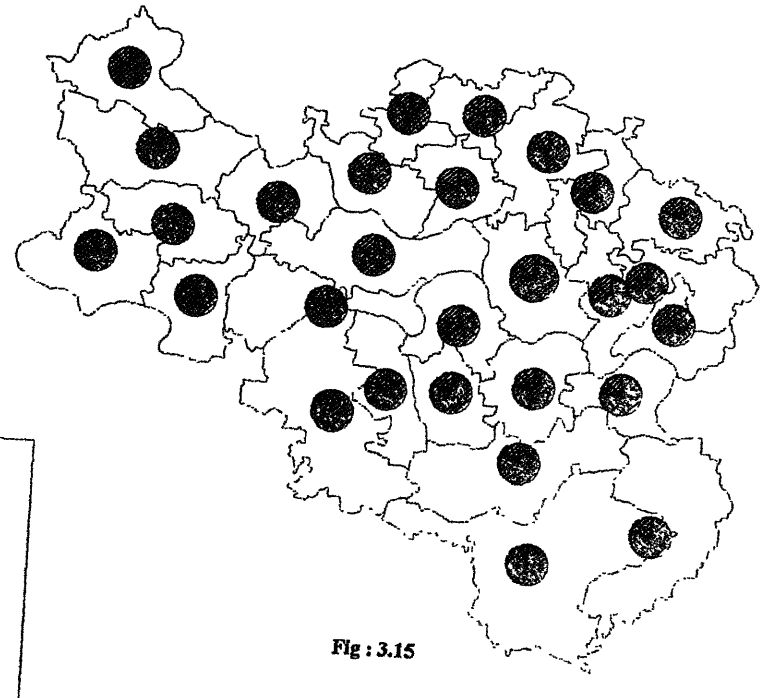


Fig : 3.14

OCCUPATIONAL STRUCTURE IN RURAL AREAS
DISTRICT ALLAHABAD, 1991



Occupational Categories
[Percent of Main Worker]

100
50
10

Primary
Secondary
Tertiary

Fig : 3.15

Table : 3.18

DISTRIBUTION OF POPULATION AMONG DIFFERENT OCCUPATIONAL CATEGORIES [% OF MAIN WORKERS], DISTRICT ALLAHABAD, 1981

Dev. Block	Cultivators	Agriculture labours	Animal Husbandry	Mining Industry	Household Industry	Manufacturing Industry	Construction Works	Trade& Commerce	Trasport& Communication	Other Works
Kara	61.57	23.86	0.20	0.03	3.11	3.06	0.06	3.29	2.53	2.30
Sirathu	80.51	4.49	0.25	0.07	2.69	2.93	0.19	3.83	2.37	2.66
Sarsawan	56.62	35.91	0.06	0.01	1.58	1.79	0.04	1.01	0.57	2.41
Manjhanpur	63.78	28.83	0.16	0.02	2.37	2.50	0.03	1.07	0.88	0.35
Kaushambi	59.84	34.96	0.07	0.13	1.33	1.37	0.04	1.30	0.35	0.61
Muratganj	47.97	30.18	0.07	0.02	5.08	5.97	0.06	5.93	3.73	1.01
Chail	45.30	35.62	0.06	0.02	2.01	2.43	0.09	3.16	1.19	10.11
Nevada	51.65	39.10	0.06	0.02	2.33	2.39	0.06	2.35	0.51	1.53
Kaurihar	58.43	29.50	0.25	0.04	3.02	3.22	0.18	0.90	1.26	3.20
Holagarh	62.28	30.48	0.71	0.03	0.50	1.05	0.46	1.48	0.68	2.32
Mauaima	64.81	19.63	0.11	0.02	4.97	1.52	0.06	2.84	2.29	3.75
Soraon	53.17	23.80	0.07	0.02	5.01	5.47	0.05	4.70	0.98	6.73
Baharia	65.80	18.69	0.77	0.10	3.45	0.25	0.57	0.70	0.15	9.53
Phulpur	59.82	12.12	0.80	0.04	3.86	4.14	1.19	3.39	2.84	11.80
Bahadurpur	38.54	33.16	0.67	0.09	7.82	0.22	1.11	1.28	1.08	16.01
Pratappur	59.62	10.42	0.81	0.14	6.97	7.52	2.83	1.77	0.53	9.40
Saidabad	52.11	26.47	0.24	0.05	9.58	0.40	0.90	0.59	0.47	9.20
Dhanupur	54.67	14.11	0.15	0.00	18.76	1.44	0.32	1.28	0.95	8.32
Handia	49.23	15.04	0.72	0.09	19.56	8.19	1.11	0.34	0.30	5.43
Jasra	51.40	28.18	0.05	0.06	5.87	6.44	0.18	3.75	1.69	2.37
Shankargarh	50.61	30.85	0.08	0.17	1.35	7.08	0.07	2.20	3.16	4.43

Chaka	37.36	27.54	0.17	0.12	7.41	8.94	0.40	5.33	5.39	7.33
Karchhana	59.02	22.77	0.07	0.09	5.98	5.95	0.21	1.69	1.37	2.85
Kaudhiyara	51.02	26.87	0.10	0.05	8.48	8.53	0.23	1.49	1.69	1.53
Uruwan	46.00	30.02	0.04	0.03	6.62	6.73	0.06	5.07	2.13	3.30
Meja	63.55	26.66	0.07	0.07	2.28	3.78	0.08	1.89	0.39	1.22
Koraon	54.17	33.55	0.03	0.11	3.20	4.43	0.04	3.65	0.19	0.63
Manda	51.79	28.03	0.07	0.05	5.53	6.30	0.05	4.43	1.60	2.15
Total Rural	54.77	25.28	0.26	0.06	5.28	3.83	0.41	2.48	1.39	6.25
Total Urban	5.18	4.42	1.04	0.81	6.09	13.45	2.79	15.14	8.40	42.68
Total District	45.92	21.56	0.40	0.19	5.42	5.55	0.83	4.74	2.64	12.75

SOURCE : District Statistical Bulletin, 1987.

Table : 3.19

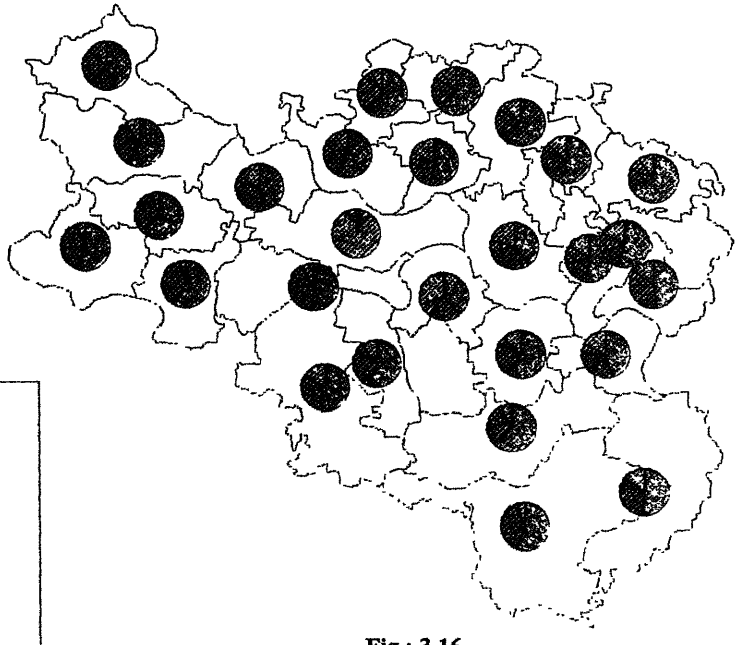
DISTRIBUTION OF POPULATION AMONG DIFFERENT OCCUPATIONAL CATEGORIES [% OF MAIN WORKERS], DISTRICT ALLAHABAD, 1991

Dev. Block	Cultivators	Agriculture labours	Animal Husbandry	Mining Industry	Household Industry	Manufacturing Industry	Construction Works	Trade& Commerce	Trasport& Communication	Other Works
Kara	54.38	27.86	0.35	0.07	2.12	1.57	0.57	4.59	1.26	7.24
Sirathu	55.09	33.49	0.40	0.12	2.07	0.83	0.64	1.73	1.83	3.80
Sarsawan	56.15	37.77	0.14	0.02	0.81	0.37	0.12	1.37	0.23	3.03
Manjhanpur	59.09	34.05	0.13	0.06	0.84	0.45	0.40	1.48	0.59	2.91
Kaushambi	54.76	39.04	0.22	0.03	0.68	0.32	0.04	1.09	0.39	3.43
Muratganj	44.47	40.63	0.19	0.03	1.11	1.30	0.67	2.57	2.10	6.92
Chail	33.92	43.15	0.45	0.02	1.24	1.06	1.48	3.39	1.88	13.41
Nevada	48.40	44.04	0.14	0.02	0.84	0.61	0.40	1.20	0.47	3.88
Kaurihar	52.54	32.12	0.20	0.02	0.54	1.38	0.56	3.38	1.09	8.17
Holagarh	53.22	32.47	0.21	0.01	1.92	1.15	0.48	3.12	0.76	6.66
Mauaima	56.43	22.75	0.31	0.02	3.73	2.03	0.82	3.59	1.18	9.14
Soraon	46.16	28.69	0.40	0.05	3.63	2.23	1.21	4.89	2.36	10.37
Baharia	62.02	21.12	0.56	0.05	1.98	3.00	1.04	2.76	1.28	6.18
Phulpur	60.13	18.95	0.44	0.07	3.11	7.29	0.64	3.13	0.96	5.29
Bahadurpur	36.55	31.71	0.86	0.07	5.26	6.38	1.90	5.37	2.22	9.69
Pratappur	62.98	16.50	0.50	0.13	5.24	4.06	0.58	3.52	0.99	5.48
Saidabad	46.35	23.11	0.47	0.16	8.30	6.61	1.28	3.47	1.46	8.77
Dhanupur	53.30	16.54	0.52	0.13	10.73	9.99	0.86	2.58	0.80	4.54
Handia	53.22	20.83	0.85	0.14	7.60	7.42	0.61	3.00	1.03	5.30
Jasra	48.56	31.81	0.60	0.39	2.33	2.89	0.74	4.10	1.24	7.34
Shankargarh	49.60	33.07	0.38	8.01	0.97	0.83	0.69	1.65	0.70	4.12

Chaka	27.34	31.76	1.30	0.35	2.90	14.61	1.61	4.55	2.45	13.13
Karchhana	50.71	26.73	0.33	0.07	3.16	4.07	1.16	3.13	1.42	9.22
Kaudhiyara	53.97	28.33	0.60	0.05	8.38	1.79	0.40	1.88	0.50	4.11
Uruwan	40.49	34.27	1.15	0.11	3.99	5.57	0.45	2.99	2.94	8.03
Meja	53.26	30.32	0.65	0.27	2.46	4.05	0.56	2.41	1.58	4.44
Koraon	58.96	33.37	0.25	0.12	1.40	1.56	0.19	1.55	0.31	2.27
Manda	52.35	26.10	0.77	0.28	4.53	5.04	0.46	2.31	3.63	4.54
Total Rural	50.68	30.18	0.46	0.35	3.18	3.43	0.75	2.88	1.32	6.77
Total Urban	4.50	4.74	0.84	0.11	5.24	10.47	2.20	25.58	6.83	39.48
Total District	42.97	25.94	0.53	0.31	3.52	4.60	0.99	6.67	2.54	11.93

SOURCE : District Statistical Bulletin, 1997.

OCCUPATIONAL STRUCTURE IN RURAL AREAS
DISTRICT ALLAHABAD, 1981



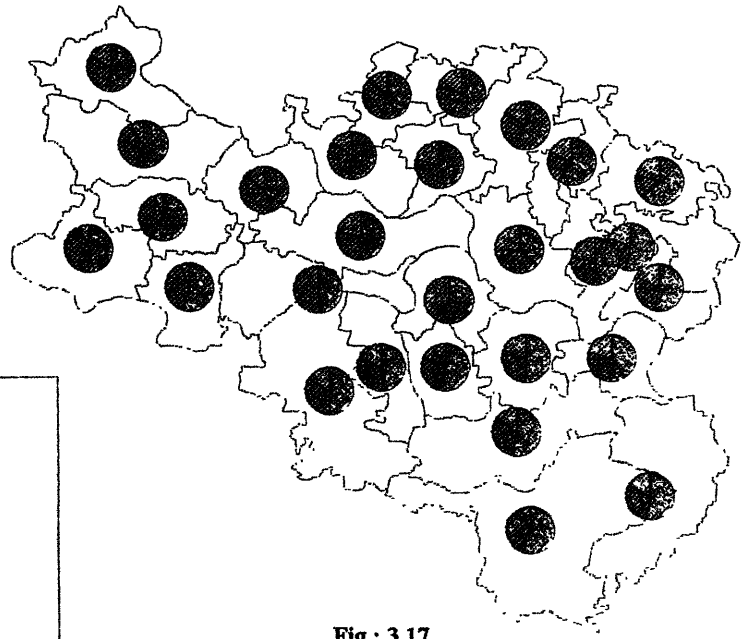
Occupational Categories
[Percent of Main Worker]

100
50
10

- Cultivator
- Agricultural Labor
- Household Industry
- Others

Fig : 3.16

OCCUPATIONAL STRUCTURE IN RURAL AREAS
DISTRICT ALLAHABAD, 1991



Occupational Categories
[Percent of Main Worker]

100
50
10

- Cultivator
- Agricultural Labor
- Household Industry
- Others

Fig : 3.17

and commerce as well as other workers category have declined. The trade and commerce and other services together provided employment to more than 50 percent of the total workers in urban areas. (see fig. 3.16 & 3.17).

3.7. Landuse and Land Cover :

Land has been the basic resource base which has been used from times immemorial. The human civilization has progressed in river valleys which have been characterized with productive and fertile soil. There are different kinds of land uses. These are forest land, cultivable barren land, fallow land, land not suitable for agriculture, other uses such as building, road construction etc., grazing and posture land, horticulture and cultivated land. The land use pattern of the study area has been presented in the table 3.20 & 3.21.

This table shows that forest land which was already declining has improved marginally but the cultivable barren land declined because this has been put to agricultural use. The land not suitable for agriculture has also come down because this too is being used for agricultural purposes. The land devoted to horticulture has also declined. This shows that horticulture is not gaining prominence. The most significant feature of landuse is net sown area. This is very well reflected even at the block level. The forested land and pasture land are confined only to few development blocks. The net sown area has gained prominence in all the blocks (see fig. 3.18 & 3.19).

The state of art of landuse pattern in the study area has been presented in the table 3.22. This table indicates the landuse pattern during the 23 years' period (1976-1999). Some of the important conclusions that can be drawn from this table are as under :

Table : 3.20

LANDUSE PATTERN [PERCENT OF TOTAL AVAILABLE AREAS]
DISTRICT ALLAHABAD, 1976

Dev. Block	Total Area	Forest Land	Cultivable Barren Land	Fallow land	Land Not Suitable for Agriculture	Other Uses	Grazing Land	Horticulture	Net Sown Area
Kara	25788	0.27	8.02	7.19	8.43	10.32	0.03	3.22	62.51
Sirathu	32066	0.66	5.82	6.15	8.56	9.11	0.08	3.69	65.93
Sarsawan	27531	0.12	8.37	7.96	3.89	10.62	0.25	3.59	65.19
Manjhanpur	21045	0.02	0.48	2.12	7.59	7.95	0.13	3.82	77.88
Kaushambi	22036	0.08	5.04	6.06	8.02	8.61	0.01	2.92	69.25
Muratganj	21252		0.74	7.94	6.02	9.83	0.43	2.52	72.52
Chail	24972		1.33	11.89	5.38	14.39	0.10	2.58	64.33
Nevada	26853		1.82	9.74	1.46	7.50	0.07	2.35	77.05
Kaurihar	22081		2.93	7.33	11.35	7.11	0.23	2.62	68.43
Holagarh	14889		0.84	1.88	4.01	9.40	0.51	8.06	75.31
Mauaima	15112	0.16	2.55		7.46	9.12	1.02	6.38	73.31
Soraon	13661		2.61	7.72	2.06	12.92	0.34	4.56	69.78
Baharia	24983		1.85	7.92	5.67	14.29	0.56	3.37	66.35
Phulpur	22319		0.96	8.74	6.67	8.75	0.15	2.14	72.57
Bahadurpur	26481		0.85	5.19	4.74	30.42	0.48	5.12	53.20
Pratappur	21402		1.51	15.01	5.96	9.29		3.36	64.87
Saidabad	15984		2.26	5.46	4.27	9.34		3.34	75.33
Dhanupur	17448		2.16	12.93	1.00	8.48		4.96	70.47
Handia	16727		5.28	1.31	3.61	11.58		4.62	73.59
Jasra	17775		3.76	9.20	1.10	8.84	0.01	2.08	75.02
Shankargarh	56152	7.38	9.41	13.28	6.78	7.72	0.17	0.84	54.42

Chaka	15214		2.87	8.69	11.47	15.90		3.70	57.37
Karchhana	23312		1.50	12.65	0.55	11.54		3.01	70.75
Kaudhiyara									
Uruwan	16910		1.23	4.83	2.15	13.81		2.88	75.11
Meja	44791	11.01	7.03	16.59	2.67	7.26		1.15	54.27
Koraon	76114	4.65	16.90	2.50	1.30	5.78		0.53	68.33
Manda	34624	6.10	13.51	31.70	4.02	8.03		1.43	35.19
Total Rural	716254	2.78	5.74	9.53	4.78	10.09	0.14	2.76	64.18
Total Urban	15349		2.49	8.44	6.76	35.19		1.27	45.85
Total District	731607	2.74	5.69	9.51	4.81	10.50	0.14	2.73	63.88

SOURCE : District Statistical Bulletin, 1977.

Table : 3.21

LANDUSE PATTERN [PERCENT OF TOTAL AVAILABLE AREAS]
DISTRICT ALLAHABAD, 1996

Dev. Block	Total Area	Forest Land	Cultivable Barren Land	Fallow land	Land Not Suitable for Agriculture	Other Uses	Grazing Land	Horticulture	Net Sown Area
Kara	25371	0.12	5.06	11.09	7.00	12.97	0.12	1.89	61.75
Sirathu	21939	0.70	4.09	13.79	8.36	15.58	0.29	3.28	53.91
Sarsawan	26574	0.03	1.41	7.61	1.69	12.53	0.23	3.04	73.44
Manjhanpur	19850	0.43	3.39	8.80	4.56	9.01	0.49	2.16	71.15
Kaushambi	21861	0.10	1.87	11.23	4.59	10.87	0.12	2.00	69.21
Muratganj	21039		6.50	12.22	4.73	8.63	0.30	2.28	65.33
Chail	24608		3.24	16.78	2.55	5.40	0.17	1.23	70.63
Nevada	26714		1.28	13.62	2.07	8.82	0.12	1.47	72.62
Kaurihar	20913	0.16	1.45	12.68	9.39	12.96	0.15	2.71	60.51
Holagarh	14846	0.02	1.02	9.19	2.70	10.89	0.34	4.94	70.89
Mauaima	15060	0.27	1.39	11.54	4.31	11.68	0.53	2.30	67.98
Soraon	13485	0.13	1.06	7.83	2.12	11.72	0.15	2.61	74.37
Baharia	14875	0.01	1.31	15.97	14.28	12.30	0.84	2.79	52.50
Phulpur	22529		2.81	4.67	5.82	10.83	0.78	1.46	73.63
Bahadurpur	26468		1.99	6.77	10.82	8.34	0.01	3.70	68.35
Pratappur	21101	0.11	1.08	15.08	2.21	11.37	0.12	2.42	67.61
Saidabad	19142	0.37	1.32	9.78	2.49	12.98	0.04	2.61	70.41
Dhanupur	17322	0.08	1.36	9.20	1.28	11.48	0.07	4.60	71.94
Handia	16051		1.45	11.69	2.06	13.09	0.04	2.57	69.10
Jasra	26958	0.01	1.57	13.12	4.86	11.59	0.05	0.45	68.36
Shankargarh	46908	10.24	9.10	15.44	2.83	7.88	0.04	1.49	52.98

Chaka	15359		2.78	11.12	12.18	20.00		1.15	52.76
Karchhana	23281		2.72	8.97	1.65	12.10	0.01	2.43	72.12
Kaudhiyara	20046	0.02	1.99	10.12	1.38	10.42	0.51	1.38	74.18
Uruwan	16890	0.01	0.78	12.30	1.72	18.07	0.01	3.49	63.63
Meja	45333	10.74	2.95	13.12	5.76	8.76		0.79	57.88
Koraon	72559	9.67	3.03	6.01	0.86	8.87	1.34	0.46	69.74
Manda	32886	8.91	5.65	15.15	1.36	10.48	0.06	1.70	56.68
Total Rural	709986	2.84	2.95	11.35	3.99	10.80	0.30	1.90	65.88
Total Urban	17457		7.49	18.79	5.73	33.10	0.05	1.08	33.77
Total District	727425	2.77	3.06	11.53	4.11	11.33	0.29	1.88	65.04

SOURCE : District Statistical Bulletin, 1997.

LANDUSE INTENSITY AND PATTERN IN RURAL AREAS
DISTRICT ALLAHABAD, 1976

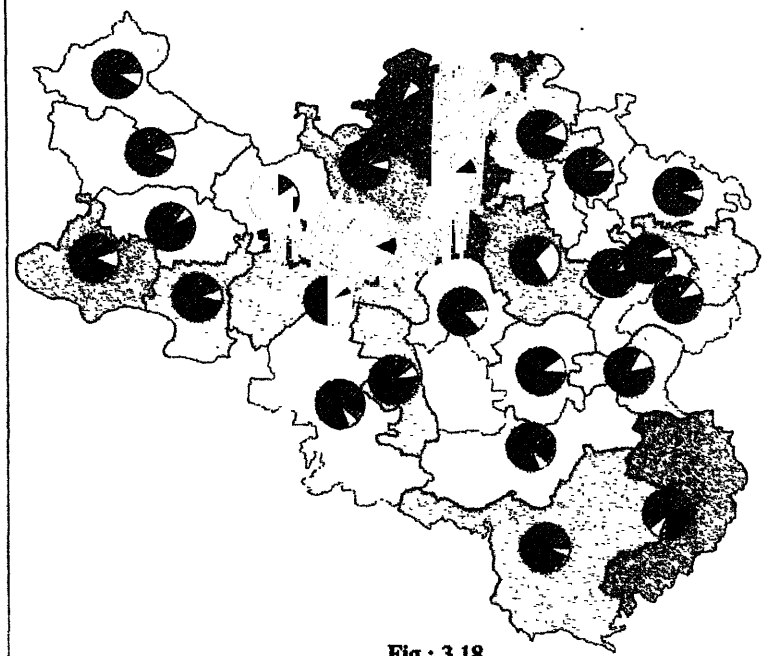


Fig : 3.18

LANDUSE INTENSITY AND PATTERN IN RURAL AREAS
DISTRICT ALLAHABAD, 1996

Landuse Intensity

- Below 121
- 121 to 135.9
- 135.9 to 150.8
- 150.8 to 165.7
- Above 165.7

Landuse Pattern

100
50
10

- Forest Land
- Cultivable Waste
- Fallow land
- Uncultivable land
- Other Than Agriculture
- Grazing Land
- Horticulture
- Net Sown Area

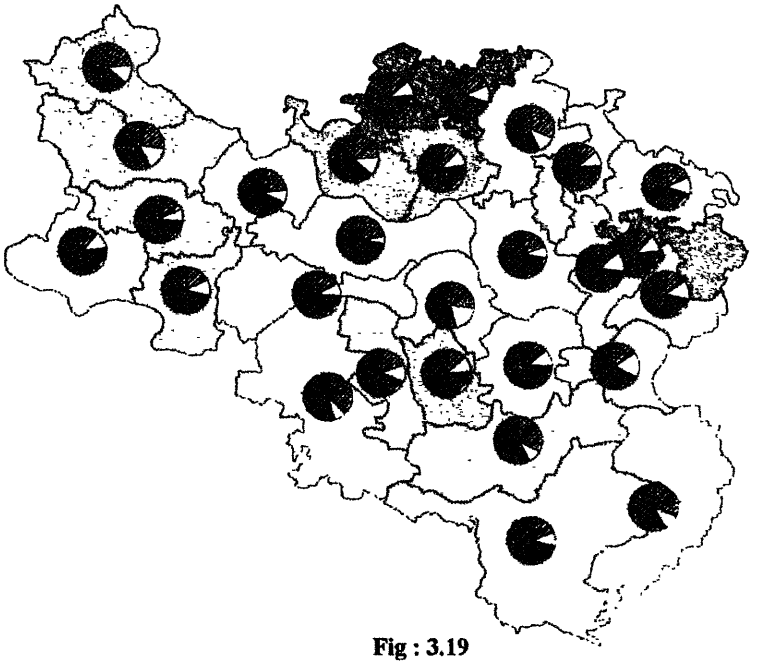


Fig : 3.19

Table : 3.22

LANDUSE PATTERN [PERCENT OF TOTAL AVAILABLE AREA]
DISTRICT ALLAHABAD, 1976-1999

Landuse Category	1976	1996	1999
Forest Land	2.74	2.77	3.69
Cultivable Barren Land	5.69	3.06	2.52
Fallow Land	9.51	11.52	9.67
Not Suitable for Agriculture	4.81	4.11	3.72
Other Uses	10.49	11.33	10.95
Grazing Land	0.14	0.29	0.32
Horticulture	2.73	1.88	1.59
Net Sown Area	63.87	65.03	67.66

SOURCE : District Statistical Bulletin, 1977, 1997, 2000.

(i) The net sown area has increased. This is rightly so because the population has been increasing and, therefore, the pressure on land has also been increasing.

(ii) The land devoted to horticulture has gone down. This indicates that there is a greater demand for food crops.

(iii) The cultivable barren land has declined because it is gradually being encroached by cultivated land.

(iv) The forest land appears to have marginally increased from 2.74% in 1973 to 3.69% in 1999.

(v) The landuse pattern shows that the area under cultivation is extending and is being intensively used.

3.8. Land Holding Pattern :

The land holding pattern of an area has great bearing on the land utilization. It also indicates the socioeconomic inequality which prevails in a region. According to David Harvey (1973), the inequitable distribution of land is the basic cause for spatial inequality in the urban areas. The land is the basic

resource base and its inequal distribution is basically the prime cause for inequality. The pattern of land holding in the area under study for the decades 1986-1996 has been presented in tables 3.23 and 3.24. From these tables it is clear that both the area and number of holdings of less than one hectare have increased during the decade 1986-1996. The holdings with more than 5 hectares have declined during this period. This is indicative of marginalizations of holdings on one hand and redistribution of land among the poorer people on the other. It also indicates that the purchasing power of the landless farmers has improved significantly and they are able to buy land from those who have been absentee landlords for a long time. They are those people who have migrated to urban areas and settled there. Such people are trying to dispose off their lands as they are not able to manage it properly. The process of decentralization and redistribution of land holding is at increase due to division of joint families into nuclear families in the rural areas. The small land holdings are not good enough for the use of new agricultural technology. Yet improved irrigational facility has provided an opportunity for commercial type of farming such as vegetable growing.

3.9. Land Utilization and Cropping Pattern :

Land utilizations and cropping patterns are basically the functions of social and economic compulsions, cultural value systems, and political decisions. Environment, especially the physical environment such as land, soil, temperature and rainfall etc. act as main determinants of cropping pattern. There are a number of good studies which have been done in the field of agriculture geography. (Shafi, 1960, 1974 and 1983; Hussain, 1976, 1970). Several methods and techniques pertaining to crop ranking, crop combination regions, crop

Table : 3.23

LANDHOLDING PATTERN IN PERCENT
DISTRICT ALLAHABAD, 1986

Dev. Block	Less Than 1.0		1.0 - 2.0		2.0 - 3.0		3.0 - 5.0		More Than 5.0	
	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
Kara	75.70	28.91	13.89	21.41	4.97	13.09	3.38	16.40	2.06	20.18
Sirathu	75.30	28.64	13.79	21.39	5.02	13.14	3.46	14.00	2.43	22.83
Sarsawan	75.31	29.02	13.94	21.60	4.99	13.24	3.50	14.02	2.27	22.12
Manjhanpur	77.13	31.86	13.16	22.83	4.70	13.64	3.01	14.42	2.00	17.25
Kaushambi	75.82	29.22	13.48	21.69	4.99	13.28	3.41	13.98	2.31	21.83
Muratganj	76.40	29.49	13.21	21.92	4.94	13.34	2.71	14.48	2.74	20.77
Chail	75.72	29.38	13.80	21.74	4.93	13.26	3.34	14.44	2.21	21.18
Nevada	76.05	29.35	13.42	21.65	4.98	13.23	3.44	14.45	2.11	21.33
Kaurihar	76.31	29.51	13.82	21.73	4.94	13.23	3.03	14.37	1.91	21.16
Holagarh	77.08	31.02	13.36	22.46	4.77	13.50	3.12	14.43	1.67	18.60
Mauaima	76.60	30.99	13.36	22.44	4.78	13.50	3.12	14.43	2.15	18.64
Soraon	77.03	31.40	13.30	22.63	4.75	13.56	3.07	14.43	1.84	17.98
Baharia	75.73	31.53	13.86	23.34	4.95	17.41	3.36	14.93	2.10	12.79
Phulpur	76.18	29.71	13.77	21.87	4.92	13.30	3.31	14.44	1.82	20.68
Bahadurpur	75.71	29.09	13.93	21.59	4.98	13.21	3.40	14.45	1.98	21.66
Pratappur	75.97	29.73	13.72	21.88	4.90	13.30	3.30	14.44	2.12	20.65
Saidabad	75.89	27.09	13.68	25.49	6.28	15.59	3.28	13.13	0.86	18.70
Dhanupur	76.03	30.36	13.62	22.16	4.87	13.40	3.22	14.41	2.26	19.67
Handia	76.73	26.47	13.52	23.19	4.83	14.35	3.16	15.41	1.76	20.58

Chaka	76.56	30.20	13.16	20.74	4.99	13.16	3.42	14.09	1.87	21.81
Karchhana	76.15	26.66	13.27	19.67	4.95	13.79	3.35	15.92	2.29	23.96
Kaudhiyara	76.04	24.37	12.63	23.46	5.43	13.03	3.97	12.86	1.94	26.29
Uruwan	76.42	30.59	13.47	22.26	4.81	13.44	3.17	14.43	2.13	19.27
Meja	74.81	28.14	14.16	21.17	5.06	13.07	3.53	14.45	2.43	23.17
Koraon	74.51	28.43	14.30	21.53	5.11	12.42	3.60	14.85	2.48	22.77
Manda	74.98	27.89	14.14	21.76	5.06	13.45	3.51	14.83	2.31	22.07
Total Rural	75.68	29.01	13.78	21.81	5.00	13.40	3.37	14.35	2.16	21.42
Total Urban	72.88	17.80	16.90	30.09	4.60	12.62	2.85	14.58	2.77	24.92
Total District	75.63	28.87	13.84	21.92	4.99	13.39	3.36	14.36	2.17	21.47

SOURCE : District Statistical Bulletin, 1987.

Table : 3.24

LANDHOLDING PATTERN IN PERCENT
DISTRICT ALLAHABAD, 1996

Dev. Block	Less Than 1.0		1.0 - 2.0		2.0 - 3.0		3.0 - 5.0		More Than 5.0	
	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
Kara	80.31	37.50	12.06	21.45	3.79	11.96	2.51	14.31	1.32	14.78
Sirathu	79.74	38.54	12.12	21.19	3.94	11.91	2.61	12.10	1.59	16.26
Sarsawan	79.63	38.43	12.10	21.47	4.19	11.98	2.61	12.10	1.47	16.02
Manjhanpur	81.27	40.27	11.09	22.51	3.51	12.27	2.18	12.36	1.96	12.59
Kaushambi	81.37	37.79	11.18	21.97	3.60	12.13	2.42	12.27	1.43	15.84
Muratganj	82.16	37.64	10.65	21.88	3.66	12.14	1.88	12.62	1.64	15.72
Chail	70.00	36.33	18.24	22.35	5.77	12.44	3.81	12.91	2.18	15.97
Nevada	80.54	39.22	11.73	21.20	3.83	11.83	2.52	12.33	1.37	15.42
Kaurihar	81.87	37.80	11.28	21.78	3.57	12.17	2.12	12.60	1.16	15.64
Holagarh	81.58	39.24	11.46	22.09	3.59	12.16	2.30	12.24	1.07	14.26
Mauaima	81.25	45.36	11.42	20.12	3.65	11.03	2.29	11.30	1.38	12.19
Soraon	81.67	40.84	11.33	21.85	3.59	12.00	2.24	12.24	1.18	13.07
Baharia	80.61	39.13	11.87	21.04	3.75	14.32	2.43	11.71	1.34	13.80
Phulpur	80.57	37.00	11.73	22.08	3.73	12.29	2.80	12.71	1.16	15.91
Bahadurpur	81.41	37.57	11.56	21.70	3.52	12.14	2.29	12.68	1.23	15.90
Pratappur	81.96	39.74	10.45	21.38	3.77	11.84	2.44	12.34	1.37	14.71
Saidabad	81.52	38.62	11.75	22.06	3.73	12.02	2.44	12.44	0.56	14.86
Dhanupur	80.92	38.51	11.56	22.11	3.68	12.19	2.35	12.56	1.49	14.63
Handia	81.67	35.53	11.28	22.73	3.67	12.80	2.28	13.15	1.10	15.79

Jasra	80.41	39.13	12.27	22.04	3.73	10.46	2.35	12.08	1.24	16.29
Shankargarh	79.75	37.07	12.42	20.88	3.67	12.88	2.54	11.36	1.62	17.81
Chaka	81.45	38.93	11.12	20.70	3.79	12.02	2.48	12.32	1.16	16.03
Karchhana	81.21	34.69	11.28	20.05	3.72	12.85	2.35	14.45	1.45	17.95
Kaudhiyara	81.04	32.48	10.78	24.27	4.13	12.31	2.82	11.14	1.24	19.81
Uruwan	81.92	39.01	11.49	22.24	3.04	12.22	2.32	12.56	1.23	13.96
Meja	80.61	36.63	11.79	21.38	3.73	12.04	2.48	12.65	1.38	17.29
Koraon	79.66	36.86	12.32	21.91	3.88	11.58	2.60	13.08	1.53	16.58
Manda	80.04	37.36	12.10	21.72	3.83	12.24	2.56	12.93	1.47	15.76
Total Rural	80.51	37.82	11.84	21.66	3.78	12.14	2.48	12.51	1.39	15.87
Total Urban	78.41	24.28	14.31	31.56	3.44	12.15	2.08	13.29	1.76	18.72
Total District	80.47	37.65	11.89	21.79	3.78	12.14	2.47	12.52	1.40	15.90

SOURCE : District Statistical Bulletin, 1997.

productivity and efficiency have been developed and used by several geographers (Hussain, 1972, 1976; Kendall, 1964; Kostrowicki, 1964; Bhatia, 1960; Singh, 1979). The purpose of the present study is to focus on the cropping pattern in so far as it has changed during the last couple of decades. The block level data has been used for this purpose (see table 3.25 and fig. 3.20 & 3.21). A comparative picture of 20 years (1976-96) shows that cereals such as rice, wheat, maize, millet etc. cover more than 50 percent at the total area under cultivation followed by pulses such as peas, tur, gram, urad etc. spreading over an area of about 15 percent. The commercial crops which include oilseeds, potato and sugarcane etc. occupied only 4 percent of the total crop land. It is interesting to note that the human intervention in land has been continuously rising because the cropped area has increased on the whole. The area under cereals has gone up in all the development blocks. Likewise, the area under pulses has also increased except a few development blocks such as Nevada, Chail, Bahadurpur, Handia and Uruwan.

The area under commercial crop has grown because the small farmers have realized the potential of commercial crops and their market demand. The cropping pattern is, thus, being dictated to a great extent by the market forces. The cropping pattern of the study area has been further investigated by selecting four crops-rice, wheat, sugarcane and potato (see tables 3.26 and fig. 3.22, 3.23). Both the tables and figures clearly reveal that the area under these major crops has increased during the two decades (1976-1996). However, increase in the percent area in the case of wheat is more significant than in case of rice. The area under rice has also registered growth but not in as much as in case of wheat. Obviously there is a greater demand of wheat than that of rice. This trend is not so distinctly visible in case of sugarcane. At the district level it has increased from

Table : 3.25

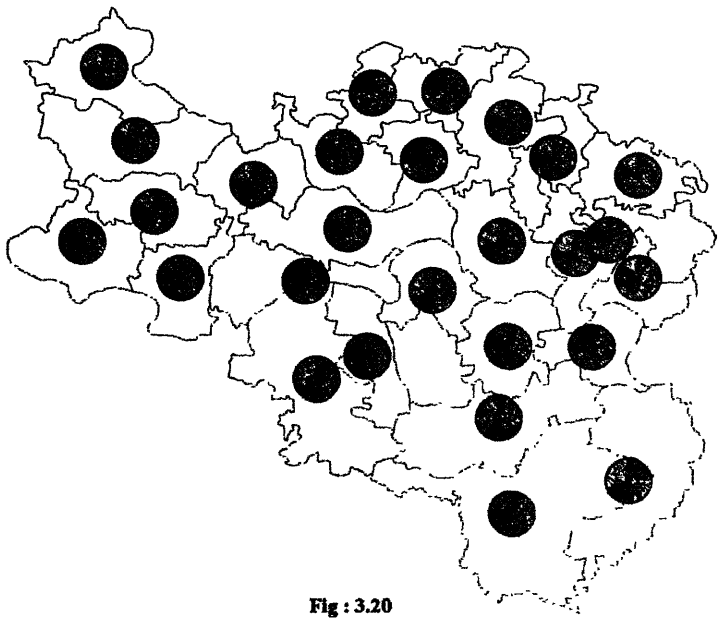
AREA IN MAJOR CROPS [PERCENT OF TOTAL AVAILABLE AREAS] DISTRICT ALLAHABAD, 1976-1996

Dev.Block	Total Cereals		Total Pulses		Commercial Crops	
	76	96	76	96	76	96
Kara	53.13	60.05	17.46	17.24	2.15	5.43
Sirathu	56.12	63.37	22.77	29.14	2.07	7.01
Sarsawan	55.97	59.14	28.91	22.49	3.93	9.60
Manjhanpur	60.35	75.60	15.21	17.68	2.59	6.65
Kaushambi	58.38	67.33	23.13	24.92	2.81	4.62
Muratganj	56.00	62.11	20.68	17.37	1.37	1.55
Chail	55.94	57.82	25.95	16.96	1.14	1.81
Nevada	63.52	62.60	27.25	22.38	3.07	2.78
Kaurihar	68.69	72.18	12.56	12.12	4.60	6.32
Holagarh	80.94	74.94	7.45	9.16	10.62	14.15
Mauaima	86.21	80.06	4.46	8.07	7.26	11.64
Soraon	77.84	80.18	10.56	10.59	10.88	8.59
Baharia	68.50	72.12	7.55	13.70	4.62	13.70
Phulpur	69.34	85.75	4.84	7.54	4.76	4.44
Bahadurpur	54.20	56.69	15.14	10.54	1.57	2.64
Pratappur	76.55	88.91	5.71	6.44	2.78	3.87
Saidabad	63.66	84.71	9.28	11.43	3.47	3.27
Dhanupur	76.69	85.26	6.62	7.57	4.99	4.19
Handia	68.94	86.94	11.11	10.87	4.26	1.87

Jasra	72.97	72.82	17.10	18.74	2.99	2.32
Shankargarh	47.31	49.78	12.48	14.07	6.27	4.50
Chaka	54.78	53.00	11.50	12.21	1.43	1.63
Karchhana	61.07	70.18	20.71	21.71	2.75	3.53
Kaudhiyara		85.09		11.65		3.13
Uruwan	72.48	73.35	17.02	15.94	0.99	3.43
Meja	46.53	61.06	13.45	14.92	0.79	4.40
Koraon	58.61	75.80	15.21	17.24	3.89	2.90
Manda	49.66	55.20	11.96	15.41	5.49	5.19
Total Rural	60.94	70.98	15.43	15.12	3.95	4.27
Total Urban	29.69	35.38	12.22	8.99	1.95	1.75
Total District	60.44	70.13	15.24	14.97	3.92	4.62

SOURCE : District Statistical Bulletin, 1977, 1997.

CROPPING PATTERN IN RURAL AREAS
DISTRICT ALLAHABAD, 1976



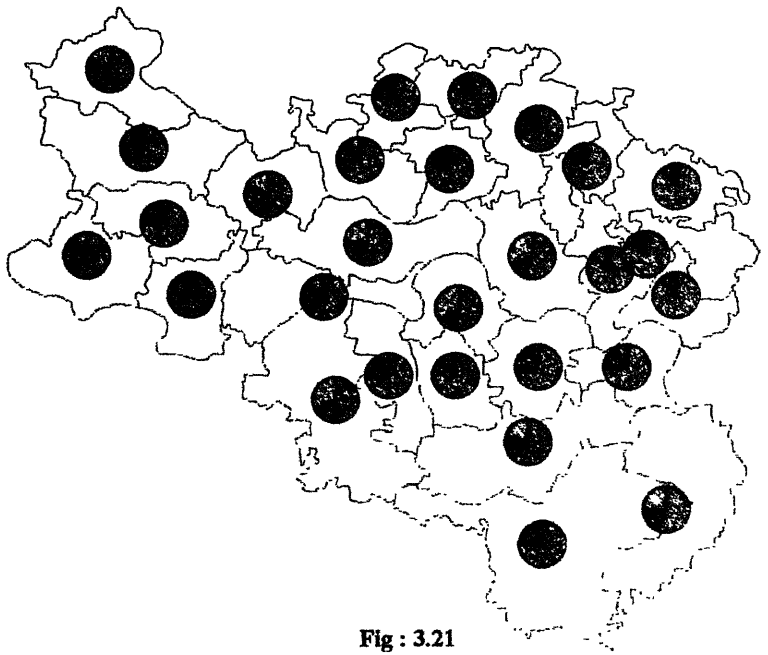
Area in Major Crops

100
50
10

- Cereals
- Pulses
- Commercial Crops
- Others

Fig : 3.20

CROPPING PATTERN IN RURAL AREAS
DISTRICT ALLAHABAD, 1996



Area in Major Crops

100
50
10

- Cereals
- Pulses
- Commercial Crops
- Others

Fig : 3.21

Table : 3.26

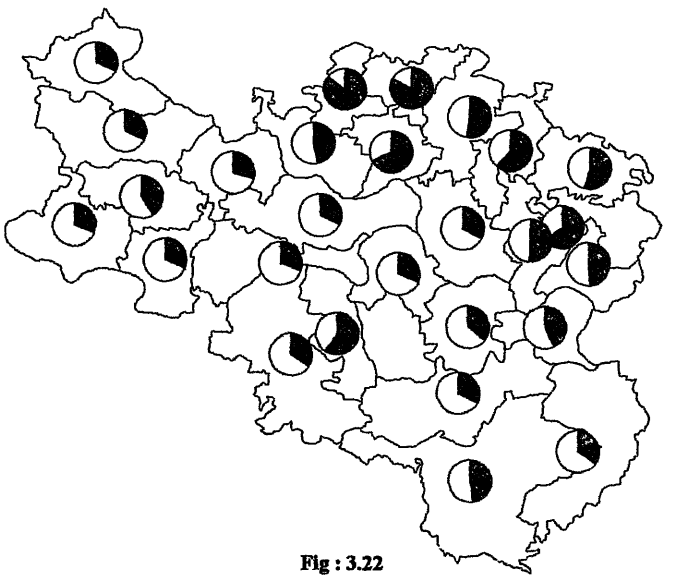
AREA IN MAJOR CROPS [PERCENT OF TOTAL AVAILABLE AREAS]
DISTRICT ALLAHABAD, 1976-1996

Dev.Block	Rice		Wheat		Sugarcane		Potato	
	76	96	76	96	76	96	76	96
Kara	13.82	15.92	16.21	29.50	0.21	0.17	1.06	3.07
Sirathu	16.45	31.55	13.74	46.21	0.73	2.31	0.88	3.35
Sarsawan	15.88	21.42	11.49	24.95	3.01	6.54	0.46	2.45
Manjhanpur	23.70	27.85	14.67	36.94	1.24	2.22	0.99	2.06
Kaushambi	18.87	21.83	10.54	28.87	1.80	2.71	0.58	1.49
Muratganj	16.80	16.60	12.01	28.83	0.31	0.23	0.46	0.88
Chail	16.47	15.52	14.43	29.28	0.43	0.35	0.59	0.98
Nevada	15.62	13.87	13.32	29.46	1.05	1.04	0.83	1.34
Kaurihar	18.36	28.17	24.59	31.22	0.15	0.03	3.84	6.03
Holagarh	38.99	48.87	36.77	43.02	0.61	0.20	8.83	7.74
Mauaima	43.49	45.70	33.51	42.34	0.99	0.44	4.95	11.09
Soraon	25.59	37.04	31.96	40.04	0.35	0.05	9.24	14.39
Baharia	23.81	53.99	25.02	31.79	0.80	0.42	2.45	12.84
Phulpur	26.56	38.03	30.52	44.08	1.08	0.38	2.52	3.90
Bahadurpur	11.87	9.36	19.41	32.12	0.07	0.01	0.95	2.37
Pratappur	24.00	36.51	27.58	48.03	1.25	0.91	0.98	2.28
Saidabad	22.10	28.47	26.79	43.36	0.71	0.37	1.51	2.58
Dhanupur	26.08	42.57	34.61	53.43	1.86	1.36	1.79	2.37
Handia	20.45	28.78	25.57	45.60	2.06	0.61	0.86	0.90

Jasra	31.51	26.34	26.94	35.51	0.33	0.01	0.59	0.47
Shankargarh	15.79	20.06	18.84	25.55	0.03	0.00	0.03	0.02
Chaka	11.91	11.06	17.41	30.62	0.37	0.51	0.88	0.85
Karchhana	13.54	18.58	19.72	36.33	1.04	1.47	1.04	1.45
Kaudhiyara		43.50		46.47		0.87		1.29
Uruwan	17.62	21.46	24.71	36.44	0.63	0.32	0.28	2.37
Meja	16.13	25.63	15.99	29.76	0.19	0.04	0.32	0.34
Koraon	27.16	33.85	19.79	35.87	0.11	0.11	0.08	0.17
Manda	17.87	22.46	16.28	26.39	0.27	0.16	0.32	0.62
Total Rural	20.48	26.39	20.29	34.80	0.69	0.76	1.28	2.43
Total Urban	2.54	11.66	12.04	18.71	0.03	0.06	1.43	1.24
Total District	20.19	26.04	20.16	34.41	0.68	0.74	1.28	2.40

SOURCE : District Statistical Bulletin, 1977, 1997.

CROPPING PATTERN IN RURAL AREAS
DISTRICT ALLAHABAD, 1976



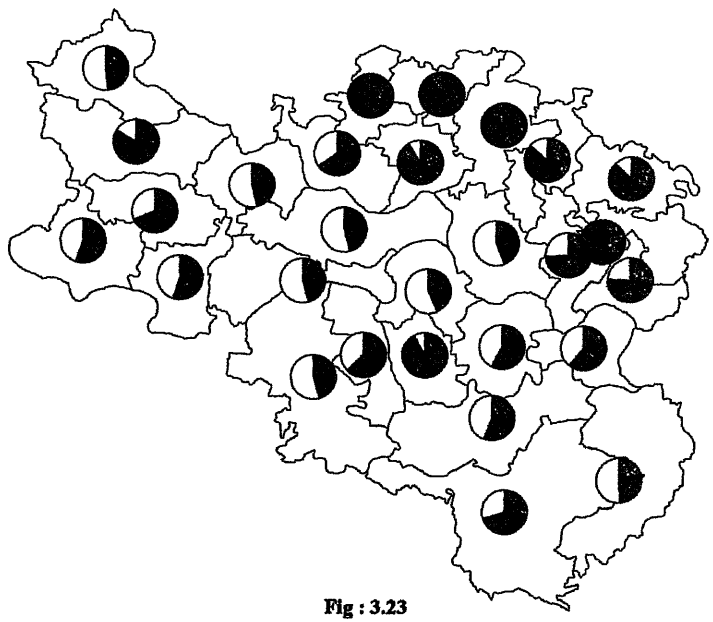
Area in Major Crops

100
50
10

- Rice
- Wheat
- Sugarcane
- Potato
- Others

Fig : 3.22

CROPPING PATTERN IN RURAL AREAS
DISTRICT ALLAHABAD, 1996



Area in Major Crops

100
50
10

- Rice
- Wheat
- Sugarcane
- Potato
- Others

Fig : 3.23

0.68 percent to 0.74 percent. The potato, however, appears to be in great demand. The area under potato crop has increased in all the development block of the district.

The per hectare production of major crops in the study area has been presented in table 3.27. The rice and wheat which are the staple food crops have shown increased productivity during 1986 and 1996. Even maize, millet, gram, Moong, Masur, mustard, til (sesame), tobacco and potato have witnessed increase in the per hectare production. While potato, wheat and mustard continued to show increase in their per hectare production in 1999, all other crops except arhar (Tur) have shown declining trend in their per hectare production. There is no causal explanation. This may be due to some occasional factors. The most significant aspect in this table is the enhanced per hectare production of Arhar

Table : 3.27

PRODUCTION OF MAJOR CROPS [QUINTAL / HECTARE]
DISTRICT ALLAHABAD, 1986-1999

Major Crops	1986	1996	1999
Rice	23.08	38.84	17.84
Maize	5.71	33.23	13.82
Jowar	3.74	13.07	8.20
Bajra	6.31	13.37	9.35
Wheat	17.25	18.50	19.24
Chana	8.85	10.73	10.11
Arhar	18.28	13.27	26.30
Moong	7.00	8.83	4.26
Masur	5.59	8.58	7.99
Mustard	5.45	6.53	7.75
Til	0.96	2.56	1.66
Sugar Cane	419.74	462.25	449.00
Tobacco	6.67	44.04	59.83
Potato	176.82	165.56	261.70

SOURCE : District Statistical Bulletin, 1987, 1997, 2000.

(Tur) which is the major pulse of the study area. The per hectare production of this crop in 1999 was 26.30 quintal per hectare. Pulses are the main sources of protein and the increased productivity of Tur is a happy state of affair.

3.10. Sources of Irrigation and Cropping Intensity :

The irrigation plays very important role in determining the cropping intensity. The cropping intensity increases with improving irrigation facility. The major sources of irrigations are canals, wells, private and public tubewells, boring pumps etc. The dependence on wells, public tubewells and Rahat has declined. The importance of private tubewells and boring pumps has increased. The comparative figures of different sources of irrigation have been given in the tables 3.28 and 3.29. The irrigation intensity and landuse intensity have been presented in the tables 3.30 & 3.31 (see figures 3.24, 3.25, 3.18 & 3.19). The irrigation intensity has been calculated by using the formula :

$$\frac{\text{Gross irrigated area}}{\text{Net irrigated area}} \times 100$$

The irrigation intensity at block level has improved in all the blocks. Likewise the landuse intensity which has been calculated by using the formula :

$$\frac{\text{Gross sown area}}{\text{Net sown area}} \times 100$$

has also improved. In fact the landuse and irrigation intensity have reached the upper limit. The saturation level has already been attained and in some of the blocks due to greater use of land, the environmental problems such as soil erosion, land degradation and problem of alkalinity have already started emerging.

3.11. Mining :

The mining activity has been yet another important source of economic base. The area under study is basically constituted by the alluvial deposits and,

Table : 3.28

SOURCES OF IRRIGATION [PER LAKH POPULATION]
DISTRICT ALLAHABAD, 1986

Dev. Block	Canals [L / 1000 Sq Kms.]	Public Tubewells	Wells	Rahats	Handpumps	Boring Pumpsets	Private Tubewells
Kara	211.05	28.30	1485.98	0.91	220.88	260.14	1012.26
Sirathu	224.65	26.95	1236.87	1.42	75.18	95.03	1361.70
Sarsawan	514.60	1.01	426.71		237.17	428.74	1035.87
Manjhanpur	387.19	21.85	1570.9	4.86	278.00	95.90	1266.19
Kaushambi	429.86	19.90	317.24	6.63	26.53	110.54	997.04
Muratganj		64.80	870.92	4.76	98.15	132.45	1049.11
Chail	5.08	43.66	655.64		100.01	72.23	807.25
Nevada	295.45	33.50	573.00	1.72	61.85	103.95	1069.54
Kaurihar	170.94	9.05	725.56		104.16	11.77	1018.13
Holagarh	247.07		1014.92		185.63	217.92	937.23
Mauaima	278.48	6.60	975.14		79.24	34.11	1368.05
Soraon	366.20	9.48	716.76		69.21	36.02	1035.33
Baharia	104.37	21.09	757.72		86.53	74.89	1087.86
Phulpur	125.87	50.43	579.10		131.49	181.92	1028.50
Bahadurpur		50.39	327.23	2.49	68.43	93.31	741.56
Pratappur		77.39	428.68		45.22	126.95	1228.64
Saidabad		74.76	490.59		89.55	176.77	939.12
Dhanupur	168.35	64.86	950.17		86.78	447.04	887.93
Handia		81.86	702.23		243.61	37.47	811.70

Jasra	720.38	13.36	900.39	15.41	254.91	370.02	455.34
Shankargarh	836.63	3.74	468.02	2.50	913.58	499.23	128.55
Chaka	163.67	55.17	271.36		130.61	77.69	591.13
Karchhana	401.61	68.33	1007.39		109.99	184.15	554.11
Kaudhiyara	420.09	6.87	49.48		180.06	301.02	674.90
Uruwan	1125.86	60.30	568.02		370.57	132.28	416.29
Meja	422.03	3.47	569.24	3.48	464.90	156.51	40.57
Koraon	339.11	0.75	622.65	13.60	279.59	219.89	24.18
Manda	430.62	3.01	1197.65	121.47	455.77	340.32	40.15
Total Rural	322.45	33.84	733.90	6.05	188.30	179.13	820.55
Total Urban							
Total District	315.93	26.94	584.38	4.82	149.93	142.64	653.38

SOURCE : District Statistical Bulletin, 1987.

Table : 3.29

SOURCES OF IRRIGATION [PER LAKH POPULATION]
DISTRICT ALLAHABAD, 1996

Dev. Block	Canals [L / 1000 Sq Kms.]	Public Tubewells	Wells	Rahats	Handpumps	Boring Pumpsets	Private Tubewells
Kara	216.03	23.22	6.53		0.72	1978.11	242.37
Sirathu	224.86	37.89			4.45	1979.82	222.33
Sarsawan	549.07	1.67	10.04	6.69	69.46	1990.94	25.94
Manjhanpur	406.63	27.72	183.53	183.53	4.77	2293.17	66.91
Kaushambi	434.19	16.90	303.27	283.70	158.30	982.75	64.03
Muratganj		51.37	112.47	106.27	1.77	1832.35	186.87
Chail	4.06	51.12	84.40	83.22	1.18	564.67	507.02
Nevada	292.03	41.86	7.84	4.36	14.82	1325.45	239.80
Kaurihar	171.84	9.86	57.08	57.08	19.03	932.38	379.16
Holagarh	256.58				63.03	1763.29	228.99
Mauaima	415.49	2.54	44.03	44.03	50.81	1606.29	573.25
Soraon	384.90	5.28	99.59	99.59	0.88	1151.04	532.33
Baharia	108.52	16.55	73.93	59.59	3.31	1100.71	661.53
Phulpur	128.72	24.68	147.41	133.4	49.36	1179.31	500.27
Bahadurpur		40.84	25.95	14.41	38.92	437.23	393.52
Pratappur		56.53	71.82	71.16	1.33	1107.23	675.64
Saidabad		54.68	40.26		46.27	500.52	501.12
Dhanupur	173.11	46.89	33.02	8.58	9.24	510.51	671.00
Handia		58.06	127.72	94.34	81.28	642.24	382.44

Jasra	563.80	47.15	55.16	46.26	106.76	1260.68	112.99
Shankargarh	774.21	1.94	40.93	33.13	451.15	419.98	25.33
Chaka	130.21	53.43	10.21	4.71	14.14	183.86	219.22
Karchhana	429.55	95.52	10.33		14.20	973.32	335.63
Kaudhiyara	458.85	22.18	8.06	8.06		1871.9	166.32
Uruwan	1154.52	92.86	4.56	3.04	54.04	812.87	290.74
Meja	425.15	4.26	350.41	297.55	487.68	804.00	124.48
Koraon	311.39		245.55	210.00	513.53	970.20	36.64
Manda	518.13	162.04	341.99	333.46	449.45	1078.00	49.46
Total Rural	322.45	35.60	83.64	72.99	91.33	1093.93	320.14
Total Urban							
Total District	315.93	28.20	66.26	57.83	72.36	866.68	253.63

SOURCE : District Statistical Bulletin, 1997.

Table : 3.30

IRRIGATION INTENSITY, DISTRICT ALLAHABAD, 1976-1996

Dev. Block	76	96	Difference
Kara	116.72	140.54	23.81
Sirathu	106.01	128.97	22.96
Sarsawan	118.04	130.03	11.99
Manjhanpur	102.87	117.56	14.69
Kaushambi	104.52	149.89	45.36
Muratganj	104.46	117.05	12.59
Chail	106.70	139.27	32.57
Nevada	98.25	133.79	35.54
Kaurihar	126.42	179.14	52.71
Holagarh	138.08	185.61	47.53
Mauaima	124.90	199.69	74.79
Soraon	136.43	178.16	41.73
Baharia	112.25	127.78	15.54
Phulpur	103.94	143.06	39.12
Bahadurpur	116.83	133.04	16.22
Pratappur	158.35	141.52	-16.83
Saidabad	142.68	130.02	-12.66
Dhanupur	193.29	156.31	-36.98
Handia	135.43	139.43	3.99
Jasra	114.39	178.82	64.43
Shankargarh	108.99	146.54	37.56
Chaka	117.02	155.16	38.14
Karchhana	122.39	146.92	24.53
Kaudhiyara		165.77	165.76
Uruwan	120.03	153.92	33.89
Meja	139.21	151.26	12.05
Koraon	147.68	163.21	15.54
Manda	137.55	156.72	19.17
Total Rural	124.94	149.10	24.16
Total Urban	132.09	56.25	-75.83
Total District	124.97	149.21	24.24

SOURCE : District Statistical Bulletin, 1977, 1997.

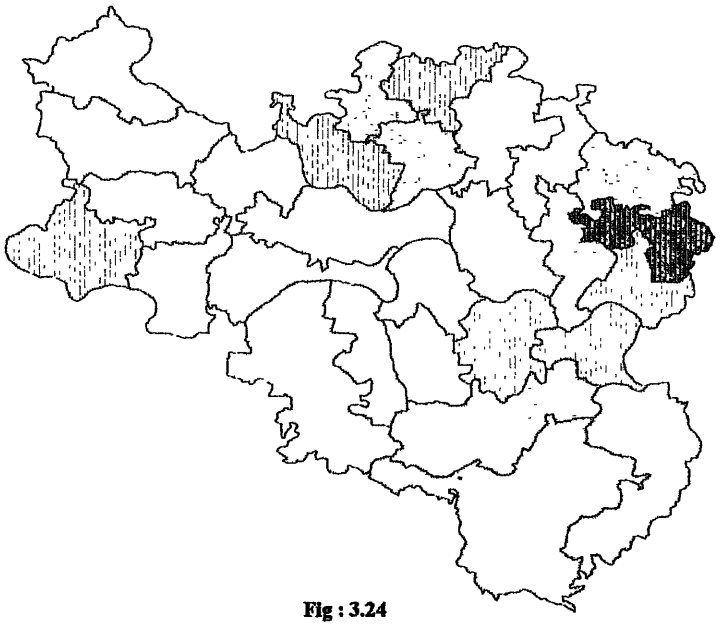
Table : 3.31

LANDUSE INTENSITY, DISTRICT ALLAHABAD, 1976-1996

Dev. Block	76	96	Difference
Kara	115.98	142.73	26.75
Sirathu	122.31	138.88	16.58
Sarsawan	138.81	123.08	-15.72
Manjhanpur	105.85	145.70	39.84
Kaushambi	124.10	143.10	19.00
Muratganj	111.80	126.00	14.20
Chail	142.70	131.77	-10.93
Nevada	124.71	126.00	1.29
Kaurihar	134.16	158.47	24.31
Holagarh	158.37	173.13	14.75
Mauaima	146.18	180.48	34.30
Soraon	159.63	161.94	2.31
Baharia	125.03	147.06	22.03
Phulpur	116.48	137.18	20.70
Bahadurpur	142.24	106.14	-36.10
Pratappur	123.90	150.33	26.44
Saidabad	117.61	146.28	28.67
Dhanupur	136.10	167.27	31.17
Handia	115.24	148.72	33.48
Jasra	126.66	140.67	14.01
Shankargarh	122.71	129.22	6.51
Chaka	122.75	132.05	9.29
Karchhana	122.28	135.09	12.81
Kaudhiyara		151.67	151.67
Uruwan	126.34	149.51	23.18
Meja	121.55	139.70	18.15
Koraon	130.33	148.75	18.43
Manda	192.69	135.71	-56.98
Total Rural	129.41	141.82	12.41
Total Urban	111.79	146.25	34.46
Total District	129.21	141.87	12.67

SOURCE : District Statistical Bulletin, 1977, 1997.

IRRIGATION INTENSITY IN RURAL AREAS
DISTRICT ALLAHABAD, 1976

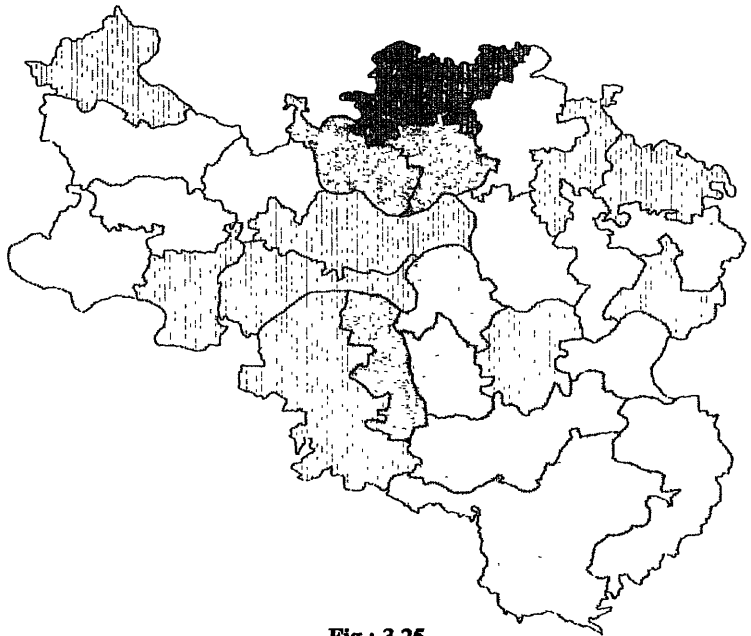


Irrigation Intensity

- Below 117.2
- 117.2 to 136.2
- 136.2 to 155.2
- 155.2 to 174.2
- Above 174.2

Fig : 3.24

IRRIGATION INTENSITY IN RURAL AREAS
DISTRICT ALLAHABAD, 1996



Irrigation Intensity

- Below 133.5
- 133.5 to 150
- 150 to 166.5
- 166.5 to 183
- Above 183

Fig : 3.25

therefore, for a long time the mining potential of the study area could not be ascertained. Of late, it has assumed importance because the geological formation of the Shankargarh area is such that it has immense potential of building materials. The sand stone found in the area has the thickness of 1.3 meters to 3.3 meters. This is quite rich in silica sand as well. Even the Holagarh in Soraon is marked by the presence of silica sand. This is an important raw material used in glass factory. The silica sand is exported from here to different glass factories of the state and even outside the state. The doab and trans-Yamuna tract are characterized by the presence of Kankar which is used in road construction. The mining has, thus, become important activity in the study area, but unscientific mining of building material, kankar and silica sand have started causing environmental problems. The forests are being depleted and the vegetation cover is declining. The land degradation process has already set in.

3.12. Small and Large Scale Industries :

The process of industrialization is a late phenomenon in the study area. There have been some traditional household industries. As many as nine categories of industries have been reported in Allahabad district. The industrial groups, industrial units and the industrial target for the year 1996-1997 have been presented in table 3.32. Engineering industry has largest number of units followed by mixed industry and industry based on forest. The forest based industries are basically biri making industries. The Handicraft and agro-based industries are only next in importance. These industries have greater potential to grow because agro-based industries have the largest target of development. The largest number of industries are found in Chaka and Handia blocks followed by Sirathu and Phulpur

blocks. The spatial development of industries (see fig. 3.26) is very skewed which is also evident from the table 3.33.

Table : 3.32

POSITION OF SMALL INDUSTRIAL UNITS IN SEVENTH PLAN DISTRICT ALLAHABAD, 1996-1997

Industrial Groups	Small Industrial units	Target
Industary Based on Agriculture	308	443
Industary Based on Forest	508	60
Industary Based on Animal	82	65
Industary Based on Cloth	132	131
Chemical Industary	182	175
Engineering Industary	912	106
Industary Based on Building Product	81	67
Mixed Industary	554	218
Handicraft Industary	446	
Total District	3212	1265

SOURCE : Industrial Progress Report, Allahabad, 1996-1997.

These are some the characteristics of the socioeconomic environment which have great bearing on the spatial patterns of development. Even the physical environment has been heavily influenced by the socioeconomic conditions. These impacts have been examined in the next chapter.

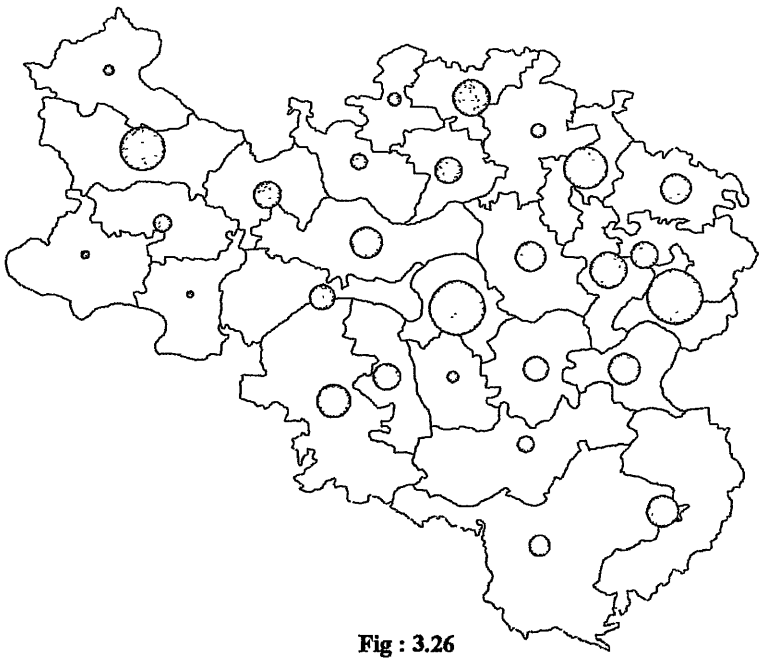
Table : 3.33

DISTRIBUTION OF SMALL INDUSTRIAL UNITS DISTRICT ALLAHABAD, 1996-1997

Dev. Block	Small Industrial units	Percent
Kara	6	0.46
Sirathu	98	7.62
Sarsawan	4	0.31
Manjhanpur	20	1.55
Kaushambi	3	0.23
Muratganj	39	3.03
Chail	52	4.04
Nevada	35	2.72
Kaurihar	15	1.16
Holagarh	11	0.85
Mauaima	68	5.29
Soraon	41	3.19
Baharia	13	1.01
Phulpur	93	7.23
Bahadurpur	47	3.65
Pratappur	48	3.73
Saidabad	71	5.52
Dhanupur	40	3.11
Handia	146	11.36
Jasra	40	3.11
Shankargarh	56	4.35
Chaka	146	11.36
Karchhana	36	2.8
Kaudhiyara	8	0.62
Uruwan	55	4.28
Meja	15	1.16
Koraon	24	1.86
Manda	55	4.28
Total Rural	1285	40.00
Total Urban	1927	59.99
Total District	3212	100.00

SOURCE : Industrial Progress Report, Allahabad, 1996-1997.

DISTRIBUTION OF SMALL INDUSTRIAL UNITS
DISTRICT ALLAHABAD, 1996-1997



Small Industrial Units

150

75

15

Fig : 3.26

References :

Bhatia, S.S., 1960 : "An Index of Crop Diversification", *Professional Geographer*, Vol. 12, 3-4.

Haggett, P., 1975 : *Geography : A Modern Synthesis*, New York : Harper & Row Publishers, 473.

Hammond, C.W., 1979 : *Elements of Human Geography*, London : *George* Allen & Unwin, 138, 35.

Harvey, D., 1973 : *Social Justice and the City*, London : Edward Arnold.

Hussain, M., 1970 : Patterns of Crop Concentration in Uttar Pradesh, *Geographical Review of India*, Vol. 32, 169-85.

Hussain, M., 1972 : Crop Combination Regions of Uttar Pradesh : A Study in Methodology, *Geographical Review of India*, Vol. 34, 134-156.

Hussain, M., 1976 : A New Approach to the Agricultural Productivity Regions of the Sutlej-Ganga Plains of India, *Geographical Review of India*, Vol. 38, 230-236.

Hussain, M., 1976 : Agricultural Productivity of India : A Exploratory Analysis, *The National Geographical Journal of India*, 113-123.

Jafferson, M., 1939 : The Law of Primate City, *Geog. Rev.*, Vol. 29, 226-232.

Kendall, M.G., 1964 : Geographical Distribution of Crop Productivity in England, *Journal of Royal Geographical Society*, Vol. 102, 21-62.

Kostrowicki, J., 1964 : Geographical Typology of Agriculture : Principles and Methods, *Geographical Polonica*, Vol. 2, 159-67.

Misra, H.N., 1984 : *Urban System of a Developing Economy Allahabad* : IIDr and also in 1988, New Delhi : Heritage Publishers.

Shafi, M., 1960 : Measurement of Agricultural Productivity in Uttar Pradesh, *Economic Geography*, Vol. 36, 295-305.

Shafi, M., 1974 : Productivity Regions of the Great Plains of India, *The Geographer*, 4-13.

Shafi, M., 1983 : *Agricultural Productivity and Regional Imbalances : A Study of Uttar Pradesh*, New Delhi : Concenpt Publication co.

Singh, J., 1979 : A New Technique for Measuring Agricultural Productivity in Haryana (India), *The Geographer*, Vol. 19, 15-33.

Zipf, G.K., 1941 : *Human Behaviour and the Principle of Least Effort*, Cambridge.

Chapter 4

CONSEQUENTIAL IMPACT ANALYSIS

The foregoing chapter dealt with the spatio temporal changes in the social and economic environment in the area of study by focusing on the characteristics of population and human settlements, agriculture, mining and industry. It was noticed that the population is increasing at rapid rate. Small settlements are getting bigger in size. Urbanization is picking up. Several small towns are rapidly emerging which is indicative of strengthening economic base. Agriculture continues to be the major source of living of people. Mining and industry are only secondary sources of economy. The stage of economic diversification has already set in.

The socioeconomic trends which have been examined in the previous chapter are indicative of several consequential changes in the study area. These consequential changes are mostly man induced changes and therefore the present chapter aims at focusing these changes / impacts in the environment. The effort has been made to present the perceived environment as well. This chapter, thus, discusses the spatial inequality in terms of development variables, the environmental degradation and pollution, perceived environment and human behaviour.

4.1. Spatial Inequality :

One of the ways of measuring the consequential impact is examining the spatial inequality. The spatial inequality here refers to social well-being or development disparity prevailing in areas or regions. "Identifying the spatial component of social inequalities is crucial not only to the study of human geography but also to the improvement of social conditions within the society as a

whole" (Coates et al., 1977). The spatial inequality which is caused mainly due to human interventions has several manifestations. Several geographers have attempted to define and measure the spatial disparity (Berry, 1961, Harvey, 1971, 1973, Smith, 1972).

The criteria, methods and approaches of measuring inequality, however, vary considerably. There are several variables such as physical, social, economic and environmental which have been used to identify this inequality. The United Nations Research Institute for Social Development (UNRISD, 1966) listed nine basic components of social well-being. These are (1) nutrition, (2) shelter, (3) health, (4) education, (5) leisure, (6) security, (7) social stability, (8) physical environment and (9) surplus income. Over a period of time several proxy variables have been used for these in view of the non-availability of the data. While explaining the processes of regional disparities in development Myrdal (1957) in his theory of cumulative causation has shown how free market forces tend to increase inequalities between regions through 'backwash effects' resulting from a process of cumulative causation due to new increments of growth and activity. One of the most popular techniques which has been used to measure the disparity is know as Gini coefficient which is written as :

$$G_x = \frac{\sum_{i-1}^{n} (Xi-Pi)}{2}$$

where

G_x = Gini coefficient of inequality for commodity x

X_i = the proportion of item X in area i

P_i = the proportion of the total population at risk in area i

The coefficient has potential range from 0-100 with higher value representing greater inequality. Yet another related measure equally popular is the Lorenz curve which represents inequality by way of distribution curve. The simple ranking and composite ranking based on Z-score transformation is also considered to be yet another technique of differentiating the areas of inequality.

However, it has been found that multivariate analysis is more appropriate in distinguishing the areas of development disparities. Sundaram (1977) has used Principal Component Analysis to measure the spatial inequality.

The region under study also witnesses inequality in terms of socioeconomic amenities. The inequality in the study area may be visualized by looking into the distributional pattern of some of the selected facilities. The distribution patterns of some of the selected socioeconomic parameters may be understood from the following discussions :

(i) Length of Metalled Road :

The road network has direct relationship with development because it is through this that the movement of goods and traffic takes place. It has been found that the areas having greater density of roads or areas with better accessibility in terms of roads and railways have registered high economic development. The areas having low density or poor accessibility have lesser degree of economic development. The table 4.1 and fig. 4.1 present the total length of metalled roads during the decade 1985-86 - 1995-96 for the area under study. The block level density of roads in terms of area and population have also been presented. One thing which comes out very prominently is the fact that the length of roads in all

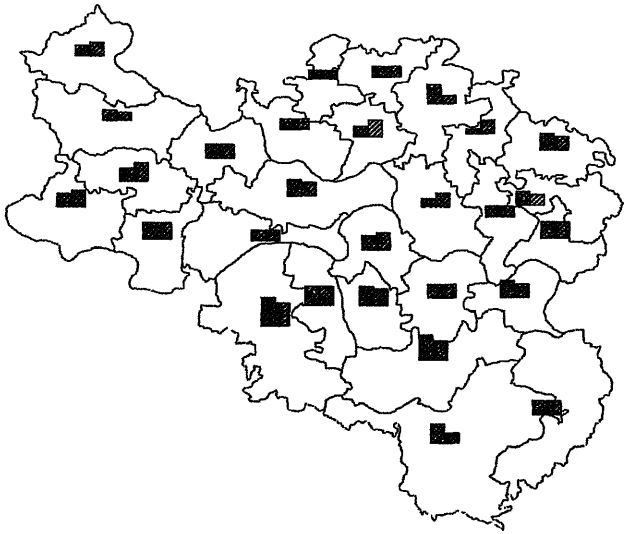
Table : 4.1

LENGTH OF METALLED ROAD [IN KMS.]
DISTRICT ALLAHABAD, 1986-1996

Dev. Block	Total Length (Kms)		Total Length Per 1000 Sq Kms.		Total Length Per 100000 Popu.	
	85-86	95-96	85-86	95-96	85-86	95-96
Kara	57	96	212.1	377.1	60.6	69.7
Sirathu	64	85	272.9	265.4	53.0	47.4
Sarsawan	59	93	213.0	349.9	75.7	77.8
Manjhanpur	50	98	238.0	492.0	65.4	93.7
Kaushambi	57	89	255.3	406.7	79.0	79.2
Muratganj	57	91	230.6	432.5	67.9	74.0
Chail	90	120	494.0	487.6	86.4	71.3
Nevada	54	71	201.0	465.8	55.1	49.1
Kaurihar	49	79	221.9	377.2	50.5	55.7
Holagarh	27	58	179.3	391.5	35.4	46.3
Mauaima	37	68	263.9	450.5	53.0	57.6
Soraon	46	103	328.6	762.4	57.1	77.2
Baharia	34	70	357.9	281.4	93.6	38.6
Phulpur	80	115	138.5	510.5	31.3	76.7
Bahadurpur	61	93	219.2	358.9	47.8	75.6
Pratappur	78	103	427.6	501.2	87.5	68.5
Saidabad	60	87	309.3	439.8	60.8	52.3
Dhanupur	55	80	246.7	461.7	65.8	52.8
Handia	66	113	383.7	704.0	83.0	82.0
Jasra	70	104	270.2	385.8	94.8	92.5
Shankargarh	86	116	192.4	250.1	133.6	113.0
Chaka	47	103	312.5	670.6	66.5	80.9
Karchhana	67	102	261.1	438.1	70.4	65.8
Kaudhiyara	48	77	203.2	384.0	92.1	77.6
Uruwan	65	86	378.1	509.1	82.3	65.6
Meja	77	107	178.9	239.4	120.0	91.2
Koraon	92	108	316.5	146.9	94.9	59.1
Manda	52	84	124.3	241.8	69.7	71.6
Total	1685	2601	235.3	364.3	70.3	66.7

SOURCE : District Statistical Bulletin, 1987, 1997.

LENGTH OF METALLED ROAD AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1986-1996



Road Length In Kms.
[Per Lakh Population]

140

1986

1996

Fig : 4.1

the blocks has increased and therefore the density of roads in terms of per thousand sq. kms. and per 1,00,000 population has also improved. The blocks witnessing comparatively longer length of metalled roads are Chail (120 kms), Shankargarh (116 kms), Phulpur (115 kms), Handia (113 kms), Koraon (108 kms), Meja (107 kms), Chaka, Pratappur & Soraon (103 kms) and Karchhana (102 kms). The blocks of Kaudhiyara (77 kms), Mauaima (68 kms) and Holagarh (58 kms) have lower length of metalled road.

(ii) Educational Facility :

The educational facility of the area under study has been presented in the table 4.2 and fig. 4.2 and 4.3. This table presents the junior basic schools, senior basic schools and high schools at block level per 1,00,000 population during the decade 1986-1996. Even though the facility has improved but the increasing population far exceeds the demand of schools. The junior basic schools have not increased keeping in view the population. The number of senior basic schools and high schools has improved considerably.

(iii) Medical Facility :

Healthy population helps in man power planning. The medical facilities help to maintain the healthy population. There are different categories of health facilities such as hospitals and dispensaries and primary health centers which have been listed here (table 4.3 & fig. 4.4). The number of these facilities has definitely increased during the decades 1986 and 1996. But the facility of beds has not been incommensurate with the increased population. Some of the blocks where the bed facility has increased significantly are Manda, Soraon, Handia and Kaudhiyara. It appears that the blocks which had influential leadership managed to get better

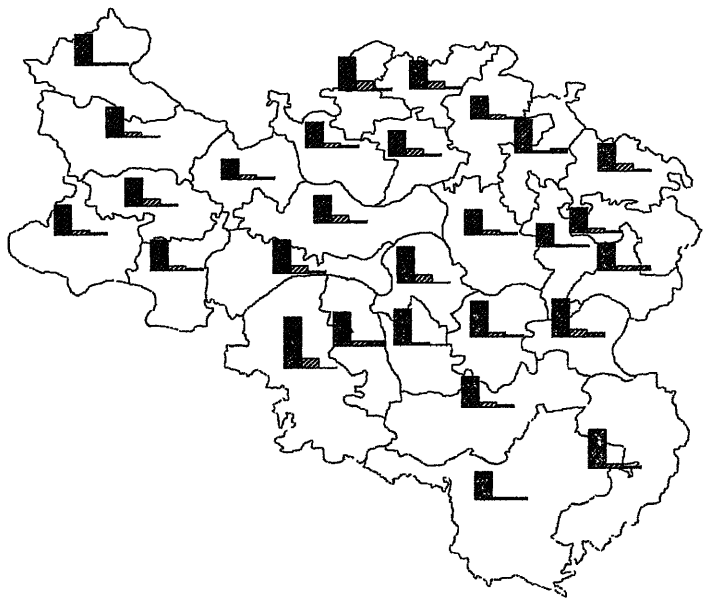
Table : 4.2

NO. OF RECOGNISED EDUCATIONAL INSTITUTIONS [PER LAKH POPU] DISTRICT ALLAHABAD, 1986-1996

Dev. Block	J. B. School		S. B. School		High School	
	86	96	86	96	86	96
Kara	58.4	50.1	5.5	10.2	5.5	5.8
Sirathu	58.2	49.6	8.5	10.6	1.4	2.2
Sarsawan	55.8	61.9	9.1	12.6	4.1	3.3
Manjhanpur	53.4	63.1	12.1	19.1	3.6	3.8
Kaushambi	55.3	69.4	8.8	16.9	3.3	2.7
Muratganj	39.1	45.6	11.4	13.0	4.8	4.1
Chail	53.2	47.6	15.9	17.2	4.8	3.6
Nevada	63.6	54.6	14.6	18.0	5.2	4.1
Kaurihar	48.9	45.1	8.2	17.6	3.6	3.5
Holagarh	61.5	53.5	21.3	17.6	4.0	4.8
Mauaima	52.8	49.1	12.1	8.5	3.3	5.1
Soraon	47.4	48.7	12.3	13.5	5.7	6.7
Baharia	41.5	45.2	10.9	7.7	3.6	3.3
Phulpur	63.0	42.7	6.3	11.3	7.2	5.3
Bahadurpur	47.3	45.6	11.8	9.1	5.6	6.7
Pratappur	54.0	51.9	14.8	11.3	5.2	5.3
Saidabad	42.1	49.9	7.0	15.6	3.9	4.2
Dhanupur	46.5	41.6	8.8	7.3	3.5	4.0
Handia	52.3	44.3	7.9	10.9	9.9	8.0
Jasra	63.7	64.1	7.2	16.9	9.3	11.6
Shankargarh	94.8	79.9	21.2	34.1	1.2	5.8
Chaka	67.6	45.6	12.4	13.4	0.1	7.1
Karchhana	67.6	60.7	8.3	12.9	5.0	5.2
Kaudhiyara	66.0	60.5	6.9	21.2	1.4	5.0
Uruwan	70.0	57.1	12.6	16.0	7.8	7.6
Meja	58.0	57.1	9.3	13.6	5.8	6.0
Koraon	54.4	63.4	6.0	13.7	5.3	4.4
Manda	69.3	66.5	8.0	11.1	7.0	6.8
Total	56.4	53.2	10.6	13.8	5.3	5.1

SOURCE : District Statistical Bulletin, 1987, 1997.

EDUCATIONAL FACILITIES AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1986



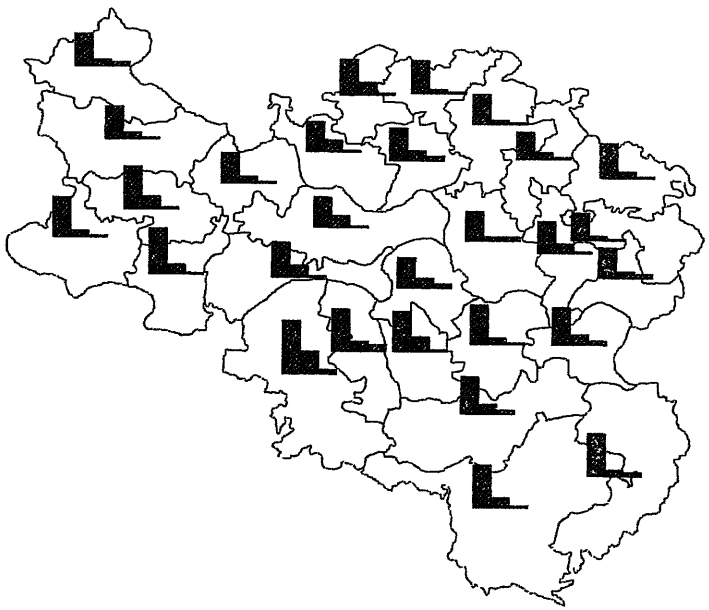
Educational Facilities
[Per Lakh Population]

95

- Junior Basic School
- Senior Basic School
- High School

Fig : 4.2

EDUCATIONAL FACILITIES AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1996



Educational Facilities
[Per Lakh Population]

80

- Junior Basic School
- Senior Basic School
- High School

Fig : 4.3

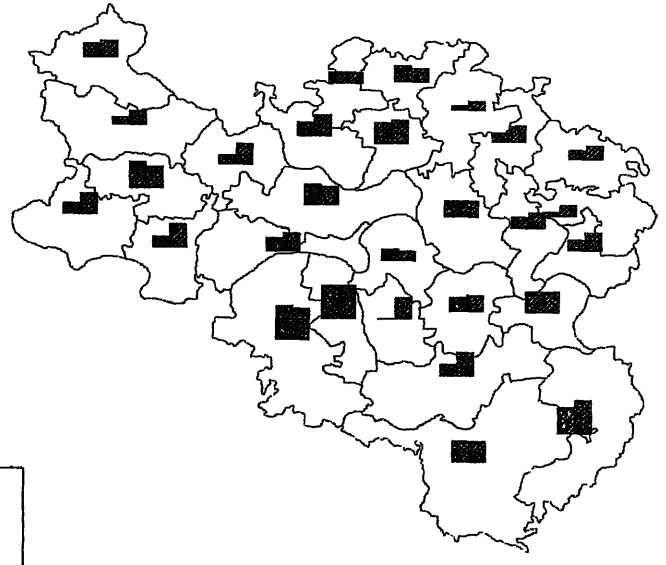
Table : 4.3

MEDICAL FACILITIES [ALLOPATHIC] PER LAKH POPULATION DISTRICT ALLAHABAD, 1986-1996

Dev. Block	Hospital / Dispensary		No. Of Beds	
	86	96	86	96
Kara	2.7	2.9	14.6	13.1
Sirathu	1.4	2.8	5.4	11.1
Sarsawan	2.0	4.2	10.1	18.4
Manjhanpur	4.9	3.8	26.7	19.1
Kaushambi	2.2	4.4	42.0	40.9
Muratganj	1.9	4.1	99.1	94.4
Chail	4.0	3.6	19.1	15.5
Nevada	2.6	3.5	10.2	13.8
Kaurihar	2.7	4.2	12.7	18.3
Holagarh	2.0	2.4	10.1	11.2
Mauaima	3.3	2.5	15.4	11.9
Soraon	3.8	4.5	35.1	60.7
Baharia	0.7	1.7	2.9	6.6
Phulpur	1.8	3.3	10.8	18.7
Bahadurpur	3.1	2.9	12.4	11.5
Pratappur	1.7	2.7	7.0	10.6
Saidabad	2.3	3.0	9.3	12.0
Dhanupur	0.9	2.0	3.5	7.9
Handia	2.0	3.6	11.8	34.8
Jasra	6.2	6.2	55.5	49.8
Shankargarh	6.2	5.8	64.9	52.6
Chaka	2.3	1.6	9.0	26.7
Karchhana	2.5	3.2	15.0	28.4
Kaudhiyara		4.0		38.3
Uruwan	3.9	3.8	46.7	36.5
Meja	2.3	4.3	46.4	39.2
Koraon	3.8	3.8	42.3	30.6
Manda	5.0	6.0	24.1	49.5
Total	2.7	3.5	22.5	26.1

SOURCE : District Statistical Bulletin, 1987, 1997.

MEDICAL FACILITIES AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1986-1996



Medical Facilities
[Per Lakh Population]

6.2

1986
1996

Fig : 4.4

health facilities.

(iv) Female literacy :

There are several indicators of development and female literacy is considered to be one of the best parameters to measure human development. The literacy among females has been very poor in the area under study in 1981. Only 4.6 percent female were literate. The female literacy has improved by three times during the last decade. In 1991, mainly 13.9 percent female were literate. The literacy among female at block level during the decade 1981-1991 has been presented in table 4.4 (fig. 4.5). The blocks where female literacy is prominent are Chaka (22.3 percent), Chail (19.6 percent), Uruwan (18.9 percent) and Bahadurpur (18.6 percent). There are some blocks such as Manjhanpur, Sarsawan, Muratganj and Kaudhiyara where female literacy is less than 10 percent. Higher female literacy is indicative of greater development. The disparity in the female literacy may be seen from the table.

(v) Urban Development :

Urbanization is one of the most important phenomena in the contemporary development. It is said to be taking place when, secondary, tertiary and quaternary sectors of economy dominate over the primary sector of production i.e. agriculture. Urbanization is, thus, considered an important indicator of regional development. In the area under study the process of urbanization has picked up after 1951. Earlier Allahabad was the only urban center of any consequence. All others such as Mauaima, Phulpur, Sarai Aqil were only big market centers with some central services. After the change of definition of urbanization in 1961 census some of them were declassified as rural settlements. Now there are 18 towns, Allahabad is, however, dominating the landscape and it

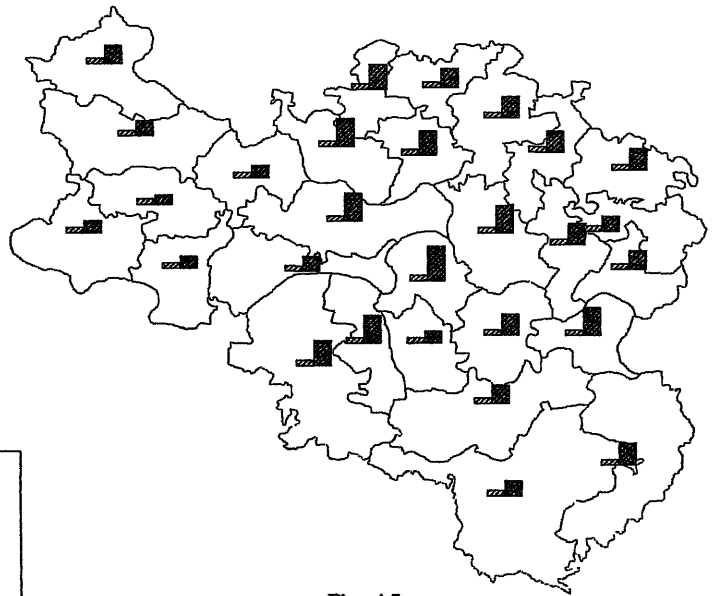
Table : 4.4

FEMALE LITERACY RATE [IN PERCENT] DISTRICT ALLAHABAD, 1981-1991

Dev. Block	1981	1991
Kara	4.7	12.0
Sirathu	5.1	10.3
Sarsawan	4.7	9.2
Manjhanpur	5.1	6.4
Kaushambi	4.8	8.7
Muratganj	4.4	9.0
Chail	4.9	19.6
Nevada	4.6	10.2
Kaurihar	5.0	17.9
Holagarh	4.7	15.7
Mauaima	4.4	12.1
Soraon	4.6	16.8
Baharia	4.7	15.4
Phulpur	4.9	13.9
Bahadurpur	4.7	18.4
Pratappur	4.6	13.8
Saidabad	4.5	14.1
Dhanupur	4.6	10.6
Handia	4.6	12.1
Jasra	4.5	18.3
Shankargarh	3.5	17.4
Chaka	3.9	22.3
Karchhana	4.0	15.6
Kaudhiyara	4.4	9.1
Uruwan	4.9	18.9
Meja	4.2	12.9
Koraon	4.9	10.2
Manda	5.1	13.7
Total	4.6	13.9

SOURCE : District Statistical Bulletin, 1987, 1997.

FEMALE LITERACY RATE AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1981-1991



Female Literacy Rate
[In Percent]

23

1981
1991

Fig : 4.5

is in the race of catching the million cities of the country. During 1981-1991 the urban population grew by 88.6 percent. The urban population constitutes 20.8 percent of the total population according to 1991 census. In 1981 it was only 18.5 percent. The distribution pattern of urban population is, however, skewed. The urban population is confined only to 14 blocks. The remaining 50 percent blocks have no urban population (table 4.5, fig. 4.6). The Chail development block (83.5%) is most urbanized followed by Manjhanpur (14.6 percent), Kaurihar (12.0 percent), Phulpur (10.1 percent), Manda (9.6 percent), Kaushambi (9.5 percent), Shankargarh (9.4 percent), Handia (8.6 percent), Muratganj (8.3 percent) and Bahadurpur and Koraon have only 4.0 percent urban population in each case.

(vi) Piped Water Supply and Electricity :

Piped water supply and electrification are two important facilities which have been extended to the rural areas. These facilities have transformed the village life and these may, therefore, be treated as development indicators. The spatial pattern of these facilities in the area under study has been presented in table 4.6 (fig. 4.7). From this table it may be observed that during 1986-1996 the number of electrified villages has increased considerably and so is the case with the pipe water supply. The pipe water supply was not available to the villages located in the blocks of Sarsawan, Manjhanpur, Kaushambi and Nevada but in 1996 more than 70 percent villages in these blocks have been extended with this facility. The electrification in the villages is also remarkable. This may be true that the power supply is highly irregular but the electrification has been extended to more than 70 percent villages in the study area. The blocks where this is less than 60 percent are Shankargarh, Meja, Koraon and Manda.

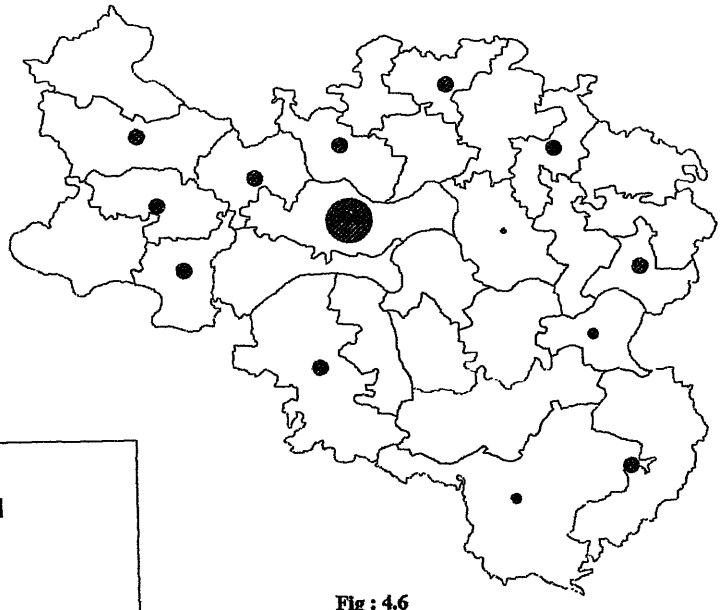
Table : 4.5

URBAN POPULATION [PERCENT OF TOTAL POPU LATION] DISTRICT ALLAHABAD, 1981-1991

Dev. Block	Urban Population	
	81	91
Kara	0.0	0.0
Sirathu	10.8	10.4
Sarsawan	0.0	0.0
Manjhanpur	15.2	14.6
Kaushambi	11.6	9.5
Muratganj	10.2	8.3
Chail	86.2	83.5
Nevada	0.0	0.0
Kaurihar	11.9	12.0
Holagarh	0.0	0.0
Mauaima	12.6	10.0
Soraon	0.0	0.0
Baharia	0.0	0.0
Phulpur	12.1	10.1
Bahadurpur	3.5	3.7
Pratappur	0.0	0.0
Saidabad	0.0	0.0
Dhanupur	0.0	0.0
Handia	10.1	8.6
Jasra	0.0	0.0
Shankargarh	9.7	9.4
Chaka	0.0	0.0
Karchhana	0.0	0.0
Kaudhiyara	0.0	0.0
Uruwan	8.5	6.6
Meja	0.0	0.0
Koraon	5.5	4.1
Manda	10.8	9.6
Total	18.5	20.8

SOURCE : District Statistical Bulletin, 1987, 1997.

URBAN POPULATION AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1981-1991



Urban Population
[Percent of Total Population]

170
85
17

1981
1991

Fig : 4.6

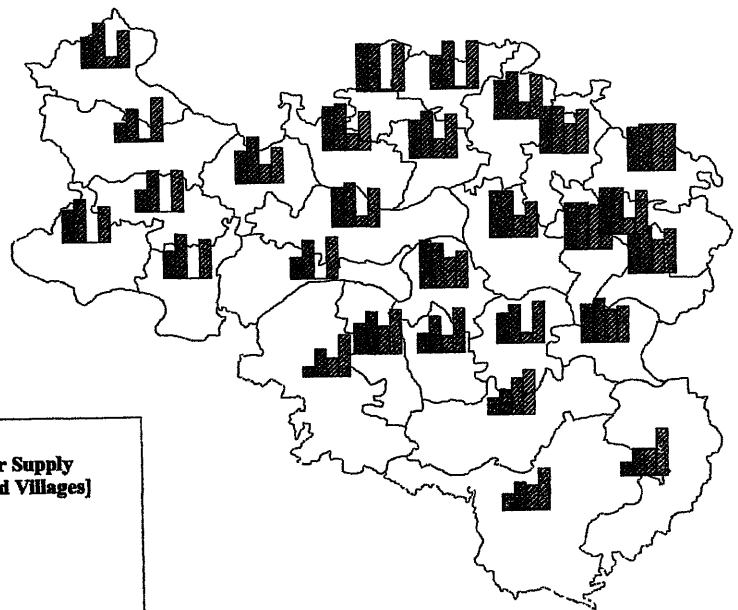
Table : 4.6

PIPE WATER SYPPLY & ELEC. [PERCENT OF TOTAL INHABITED VILLAGES] DISTRICT ALLAHABAD, 1986-1996

Dev. Block	Electrified Villages		Villages Pipe Water Supply	
	86	96	86	96
Kara	63.3	93.6	23.4	78.7
Sirathu	39.2	72.8	6.7	91.3
Sarsawan	69.2	94.9	0.0	74.5
Manjhanpur	47.5	87.9	0.0	90.8
Kaushambi	60.4	91.2	0.0	82.0
Muratganj	71.1	100.0	40.6	79.0
Chail	79.6	96.3	25.0	82.9
Nevada	45.4	79.8	0.0	87.4
Kaurihar	91.7	99.2	36.1	80.0
Holagarh	97.8	100.0	3.2	97.8
Mauaima	72.8	100.0	3.2	100.0
Soraon	81.9	100.0	38.4	93.8
Baharia	79.9	100.0	32.7	94.8
Phulpur	98.6	99.3	64.9	94.8
Bahadurpur	99.3	100.0	45.8	76.6
Pratappur	95.4	100.0	98.5	99.2
Saidabad	100.0	100.0	96.3	96.9
Dhanupur	100.0	100.0	34.8	95.0
Handia	87.3	99.2	67.6	94.0
Jasra	64.2	90.8	56.3	95.6
Shankargarh	24.9	58.9	43.0	86.7
Chaka	100.0	96.9	63.0	75.6
Karchhana	63.0	81.5	24.2	90.0
Kaudhiyara	43.2	77.1	33.3	91.6
Uruwan	81.8	96.7	70.0	75.8
Meja	36.6	54.1	74.8	93.1
Koraon	35.7	57.6	54.1	88.6
Manda	31.5	59.0	56.3	100.0
Total	69.3	87.3	41.8	89.3

SOURCE : District Statistical Bulletin, 1987, 1997.

PIPE WATER SUPPLY & ELECTRICITY AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1986-1996



Electricity & Pipe Water Supply
[Percent of Total Inhabited Villages]

100

- Elec. Villa. 1986
- Elec. Villa. 1996
- Villa. Pipe Water 1986
- Villa. Pipe Water 1996

Fig : 4.7

(vii) Irrigation and Chemical Fertilizers :

Agriculture is the most important sector of economy, and the irrigation technology and use of chemical fertilizer have transformed the productivity as well as efficiency. These two, therefore, have also been selected as the indicators for measuring the development disparity in the study area. During 1986-1996 the use of fertilizers has increased almost in all the development blocks. The per hectare use of chemical fertilizers has been shown in table 4.7 (fig. 4.8). A few development blocks where it is more than 100 kg per hectare are Manjhanpur, Muratganj, Chail, Kaurihar, Holagarh, Mauaima, Soraon, Phulpur, Bahadurpur, Pratappur, Saidabad, Dhanupur, Handia, Chaka and Uruwan.

The table 4.7 (fig. 4.8) shows the percentage of area under irrigation during 1986-1996. The irrigated area has been swinging. Some blocks have registered increase and in some blocks it has declined. However, in view of its importance in the field of agriculture, it has been selected as one of the variables for measuring the inequality.

4.2. Spatial Pattern of Development :

Based on the 11 variables listed below, the pattern of development in the study area has been determined. This analysis may help in identifying the policy measures which may be undertaken to alleviate the situation of under development to bring all the region at par with each other. The underdevelopment or poor development culminates into several socioeconomic problems such as poor quality of life, low standard of environment and surroundings.

01. Road length per lakh population (1996).

02. Junior basic school per lakh population (1996).

03. Senior basic school per lakh population (1996).

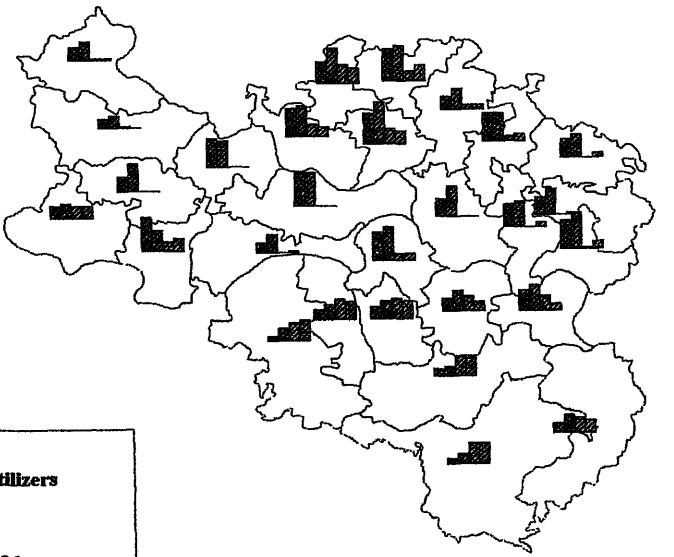
Table : 4.7

IRRIGATION & CHEMICAL FERTILIZERS DISTRICT ALLAHABAD, 1986-1996

Dev. Block	Fertilizer / Hec. In Kg.		Irrigated Area (in Percent)	
	86	96	86	96
Kara	59.3	81.5	16.9	8.2
Sirathu	49.9	63.4	17.0	0.0
Sarsawan	58.5	68.5	54.3	63.4
Manjhanpur	69.2	124.8	3.5	4.7
Kaushambi	159.4	98.1	45.1	54.0
Muratganj	134.3	114.8	0.0	0.0
Chail	155.6	151.3	0.0	0.0
Nevada	45.8	82.8	5.3	16.1
Kaurihar	125.8	148.0	56.4	51.5
Holagarh	95.0	159.5	78.0	72.9
Mauaima	140.9	149.9	53.4	66.7
Soraon	136.8	185.4	69.4	59.1
Baharia	62.3	94.3	27.4	27.0
Phulpur	135.8	125.2	25.2	37.3
Bahadurpur	77.7	141.4	0.3	2.4
Pratappur	78.1	107.9	4.0	26.6
Saidabad	102.6	114.3	5.2	21.9
Dhanupur	86.5	115.7	2.8	16.3
Handia	133.1	170.1	6.6	30.3
Jasra	53.0	76.4	99.4	79.8
Shankargarh	23.4	59.7	79.2	89.9
Chaka	131.9	152.9	41.1	30.1
Karchhana	58.9	90.7	74.7	52.9
Kaudhiyara	58.1	83.7	96.1	87.5
Uruwan	99.0	121.5	67.1	37.7
Meja	33.6	47.4	95.9	93.7
Koraon	19.7	46.9	94.8	91.3
Manda	45.9	80.9	73.2	64.6
Total	72.4	98.3	45.1	47.4

SOURCE : District Statistical Bulletin, 1987, 1997.

IRRIGATION & CHEMICAL FERTILIZERS AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1986-1996



Irrigation & Chemical Fertilizers

190

- Fert. / Hec. in Kg 1986
- Fert. / Hec. in Kg 1996
- Irri. area % 1986
- Irri. area % 1996

Fig : 4.8

04. Higher secondary school per lakh population (1996).

05. Medical facilities per lakh population (1996).

06. Female literacy per lakh population (1991).

07. Urban population (percent of total population, 1991).

08. Electrified villages (percent of total inhabited villages, 1996).

09. Villages pipe water supply (percent of total inhabited villages, 1996).

10. Fertilizer per hectare in kilogram (1996).

11. Gross irrigated area (percent of net irrigated area, 1996) see table 4.8.

The correlation matrix of the 11 variables has been presented in table 4.9. As many as 19 correlations have been found to be significant at 95% level[1]. From the correlation matrix it is clear that the variables related with different kind of schools are highly correlated with each other. So is the case with medical facilities and road length per lakh population. The electrified villages have strong correlation with use of fertilizer per hectare but the areas under irrigation have negative correlation with electrified villages. Negative correlation also exists among electrified villages, different kind of schools and medical facility. Female literacy has positive correlation with number of higher secondary school per lakh population as well as use of fertilizers per hectare.

The 11 variables have been transformed into Z-score by using the following formula :

$$Z = \frac{X - \overline{X}}{SD}$$

[1] The student t test $\left(t = r\sqrt{\frac{n-2}{1-r^2}}\right)$ has been used to measure the level of significance.

Table : 4.8

DATA OF 11 VARIABLES FOR 28 DEVELOPMENT BLOCKS DISTRICT ALLAHABAD

Dev. Block	01	02	03	04	05	06	07	08	09	10	11
Kara	69.7	50.1	10.2	5.8	2.9	12.0	0.0	93.6	78.7	81.5	8.2
Sirathu	47.4	49.6	10.6	2.2	2.8	10.3	10.4	72.8	91.3	63.4	0.0
Sarsawan	77.8	61.9	12.6	3.3	4.2	9.2	0.0	94.9	74.5	68.5	63.4
Manjhanpur	93.7	63.1	19.1	3.8	3.8	6.4	14.6	87.9	90.8	124.8	4.7
Kaushambi	79.2	69.4	16.9	2.7	4.4	8.7	9.5	91.2	82.0	98.1	54.0
Muratganj	74.0	45.6	13.0	4.1	4.1	9.0	8.3	100.0	79.0	114.8	0.0
Chail	71.3	47.6	17.2	3.6	3.6	19.6	83.5	96.3	82.9	151.3	0.0
Nevada	49.1	54.6	18.0	4.1	3.5	10.2	0.0	79.8	87.4	82.8	16.1
Kaurihar	55.7	45.1	17.6	3.5	4.2	17.9	12.0	99.2	80.0	148.0	51.5
Holagarh	46.3	53.5	17.6	4.8	2.4	15.7	0.0	100.0	97.8	159.5	72.9
Mauaima	57.6	49.1	8.5	5.1	2.5	12.1	10.0	100.0	100.0	149.9	66.7
Soraon	77.2	48.7	13.5	6.7	4.5	16.8	0.0	100.0	93.8	185.4	59.1
Baharia	38.6	45.2	7.7	3.3	1.7	15.4	0.0	100.0	94.8	94.3	27.0
Phulpur	76.7	42.7	11.3	5.3	3.3	13.9	10.1	99.3	94.8	125.2	37.3
Bhadurpur	75.6	45.6	9.1	6.7	2.9	18.4	3.7	100.0	76.6	141.4	2.4
Pratappur	68.5	51.9	11.3	5.3	2.7	13.8	0.0	100.0	99.2	107.9	26.6
Saidabad	52.3	49.9	15.6	4.2	3.0	14.1	0.0	100.0	96.9	114.3	21.9
Dhanupur	52.8	41.6	7.3	4.0	2.0	10.6	0.0	100.0	95.0	115.7	16.3
Handia	82.0	44.3	10.9	8.0	3.6	12.1	8.6	99.2	94.0	170.1	30.3
Jasra	92.5	64.1	16.9	11.6	6.2	18.3	0.0	90.8	95.6	76.4	79.8
Shankargarh	113.0	79.9	34.1	5.8	5.8	17.4	9.4	58.9	86.7	59.7	89.9
Chaka	80.9	45.6	13.4	7.1	1.6	22.3	0.0	96.9	75.6	152.9	30.1
Karchhana	65.8	60.7	12.9	5.2	3.2	15.6	0.0	81.5	90.0	90.7	52.9
Kaudhiyara	77.6	60.5	21.2	5.0	4.0	9.1	0.0	77.1	91.6	83.7	87.5
Uruwan	65.6	57.1	16.0	7.6	3.8	18.9	6.6	96.7	75.8	121.5	37.7
Meja	91.2	57.1	13.6	6.0	4.3	12.9	0.0	54.1	93.1	47.4	93.7
Koraon	59.1	63.4	13.7	4.4	3.8	10.2	4.1	57.6	88.6	46.9	91.3
Manda	71.6	66.5	11.1	6.8	6.0	13.7	9.6	59.0	100.0	80.9	64.6

Table : 4.9

CORRELATION MATRIX OF 11 VARIABLES FOR 28 DEVELOPMENT BLOCKS DISTRICT ALLAHABAD

Variables	01	02	03	04	05	06	07	08	09	10	11
01	1.00										
02	0.51☆	1.00									
03	0.51☆	0.66☆	1.00								
04	0.46☆	0.10	0.04	1.00							
05	0.62☆	0.68☆	0.53☆	0.37☆	1.00						
06	0.07	-0.17	0.11	0.49☆	-0.03	1.00					
07	0.08	-0.09	0.16	-0.22	0.09	0.21	1.00				
08	-0.29	-0.66☆	-0.37☆	0.00	-0.49☆	0.21	0.06	1.00			
09	-0.19	0.00	-0.14	0.11	0.01	-0.17	-0.15	-0.14	1.00		
10	-0.12	-0.59☆	-0.19	0.13	-0.33	0.38☆	0.25	0.74☆	0.00	1.00	
11	0.30	0.59☆	0.38☆	0.29	0.49☆	0.05	-0.29	-0.51☆	0.27	-0.32	1.00

☆ Significant at 95 % confidence level

where

X = variable

$\overline{X}$ = mean

SD = standard deviation

The data was first transformed into Z-score and the composite Z-score was computed (table 4.10). Based on the composite Z-score the blocks of the study area have been classified into following categories :

(i) More developed blocks

(ii) Less developed blocks

(iii) Under developed blocks (fig 4.9).

(i) **More developed blocks :** Jasra (10.41), Shankargarh (10.29), Soraon (5.44), Chail (4.93), Manda (3.20), Handia (2.67), Uruwan (2.14), Holagarh (2.07) and Kaudhiara (1.40).

(ii) **Less developed blocks :** Manjhanpur (0.72), Kaurihar (0.72), Kaushambi (0.35), Mauaima (0.35), Phulpur (0.31), Chaka (0.19) and Meja (0.05).

(iii) **Under developed blocks :** Pratappur (-0.60), Karchhana (-0.64), Saidabad (-1.46), Bahadurpur (-1.64), Sarsawan (-2.83), Koraon (-3.25), Murutganj (-3.85), Nevada (-4.81), Kara (-5.16), Dhanupur (-6.10), Baharia (-6.14) and Sirathu (-8.75).

4.3. Environmental Degradation :

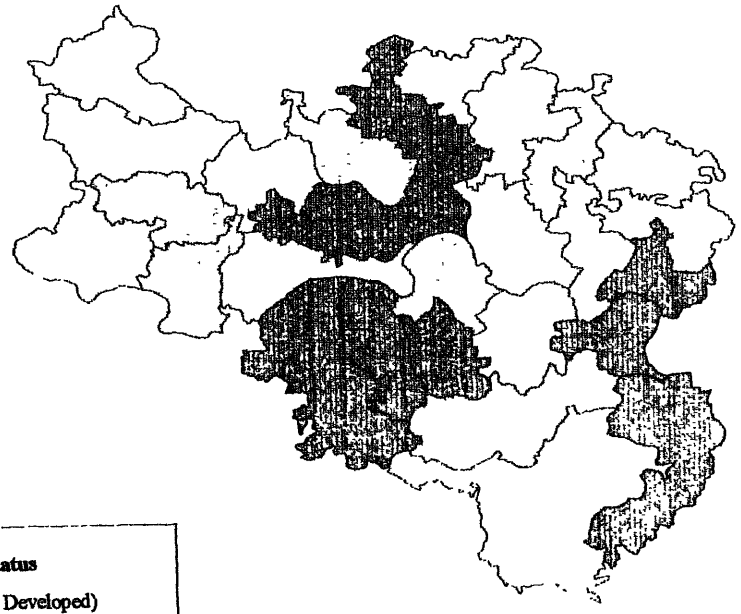
Environmental degradation refers to the adverse impact on natural environment which is both caused by nature as well as human activities. The area under study too has been witnessing different kinds of environmental degradation. While some of them are natural, most of them are man-made. The degradation which are relevant for the study in the present context are deforestation,

Table : 4.10

Z – SCORE OF 11 VARIABLES FOR 28 DEVELOPMENT BLOCKS DISTRICT ALLAHABAD

Dev. Block	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	Total
Kara	-0.02	-0.42	-0.78	0.30	-0.60	-0.44	-0.45	0.32	-1.23	-0.73	-1.10	-5.16
Sirathu	-1.35	-0.48	-0.70	-1.55	-0.69	-0.86	0.21	-1.06	0.30	-1.20	-1.37	-8.75
Sarsawan	0.46	0.83	-0.32	-0.98	0.52	-1.14	-0.45	0.40	-1.75	-1.07	0.68	-2.83
Manjhanpur	1.41	0.96	0.90	-0.73	0.17	-1.85	0.47	-0.06	0.24	0.41	-1.21	0.72
Kaushambi	0.54	1.62	0.49	-1.29	0.69	-1.27	0.15	0.16	-0.83	-0.29	0.38	0.35
Muratganj	0.23	-0.90	-0.25	-0.57	0.43	-1.19	0.07	0.74	-1.20	0.15	-1.37	-3.85
Chail	0.07	-0.69	0.54	-0.83	0.00	1.48	4.85	0.49	-0.72	1.10	-1.37	4.93
Nevada	-1.25	0.05	0.70	-0.57	-0.09	-0.89	-0.45	-0.59	-0.17	-0.69	-0.85	-4.81
Kaurihar	-0.86	-0.95	0.62	-0.88	0.52	1.05	0.31	0.69	-1.07	1.02	0.29	0.72
Holagarh	-1.42	-0.06	0.62	-0.21	-1.03	0.49	-0.45	0.74	1.10	1.32	0.98	2.07
Mauaima	-0.74	-0.53	-1.10	-0.06	-0.95	-0.41	0.18	0.74	1.37	1.07	0.78	0.35
Soraon	0.42	-0.57	-0.15	0.76	0.77	0.77	-0.45	0.74	0.61	2.00	0.54	5.44
Baharia	-1.88	-0.94	-1.25	-0.98	-1.64	0.42	-0.45	0.74	0.73	-0.39	-0.49	-6.14
Phulpur	0.39	-1.21	-0.57	0.04	-0.26	0.04	0.19	0.69	0.73	0.42	-0.16	0.31
Bhadurpur	0.33	-0.90	-0.99	0.76	-0.60	1.17	-0.22	0.74	-1.49	0.84	-1.29	-1.64
Pratappur	-0.10	-0.23	-0.57	0.04	-0.77	0.02	-0.45	0.74	1.27	-0.03	-0.51	-0.60
Saidabad	-1.06	-0.44	0.24	-0.52	-0.52	0.09	-0.45	0.74	0.99	0.13	-0.66	-1.46
Dhanupur	-1.03	-1.32	-1.33	-0.62	-1.38	-0.79	-0.45	0.74	0.76	0.17	-0.84	-6.10
Handia	0.71	-1.04	-0.65	1.43	0.00	-0.41	0.09	0.69	0.63	1.60	-0.39	2.67
Jasra	1.34	1.06	0.49	3.28	2.24	1.15	-0.45	0.13	0.83	-0.86	1.21	10.41
Shankargarh	2.56	2.74	3.74	0.30	1.89	0.92	0.14	-1.97	-0.26	-1.30	1.53	10.29
Chaka	0.64	-0.90	-0.17	0.97	-1.72	2.15	-0.45	0.53	-1.61	1.15	-0.40	0.19
Karchhana	-0.26	0.70	-0.27	-0.01	-0.34	0.47	-0.45	-0.48	0.15	-0.48	0.34	-0.64
Kaudhiyara	0.45	0.68	1.30	-0.11	0.34	-1.17	-0.45	-0.77	0.34	-0.67	1.46	1.40
Uruwan	-0.27	0.32	0.32	1.23	0.17	1.30	-0.04	0.52	-1.59	0.32	-0.15	2.14
Meja	1.26	0.32	-0.14	0.40	0.60	-0.21	-0.45	-2.29	0.52	-1.62	1.66	0.05
Koraon	-0.66	0.99	-0.12	-0.42	0.17	-0.89	-0.19	-2.06	-0.02	-1.63	1.58	-3.25
Manda	0.09	1.32	-0.61	0.82	2.07	-0.01	0.16	-1.97	1.37	-0.74	0.72	3.20

SPATIAL PATTERN OF DEVELOPMENT AT BLOCK LEVEL
DISTRICT ALLAHABAD, 1996



Development Status

- 1.4 & Above (More Developed)
- 0.05 to 0.72 (Less Developed)
- -0.6 & Below (Under Developed)

Fig : 4.9

wasteland, wetland and flood hazards. In the present study an effort has been made to focus on these issues as they seem to be critical in planning and management for sustainable development in the study area.

I. Deforestation :

The forest which is the major source of ecological protection has deteriorated very fast in the recent past. Only 2.74 percent area is reported to be under forest cover and this is not distributed throughout the district. It is confined in the trans-Yamuna tract in the tahsils of Meja, Jasra and Karchhana. The flat land and rich soil found in the area has been intensively used for food crop production and this has resulted into soil erosion. Both sheet and gully erosions are quite common but gully erosion is quite serious problem especially in the reverine tracts. The area of degraded forest belonging to reserved / protected category expands over an area of 2.35 percent only.

II. Wasteland :

Waste lands are those lands which are degraded for one region or the other or may be due to greater pressure of human population. "These are degraded lands which can be brought under vegetative cover, with reasonable effort, and which is currently under utilized and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes. Wasteland can result from inherent / imposed disabilities such as by location, environment, chemical and physical properties of the soil or financial or management constraints" (RSAC, UP, 1988).

There are different kind of wastelands which are found in the study area (table 4.11 & fig. 4.10). The spatial distribution and characteristic of wasteland is as under :

Table : 4.11

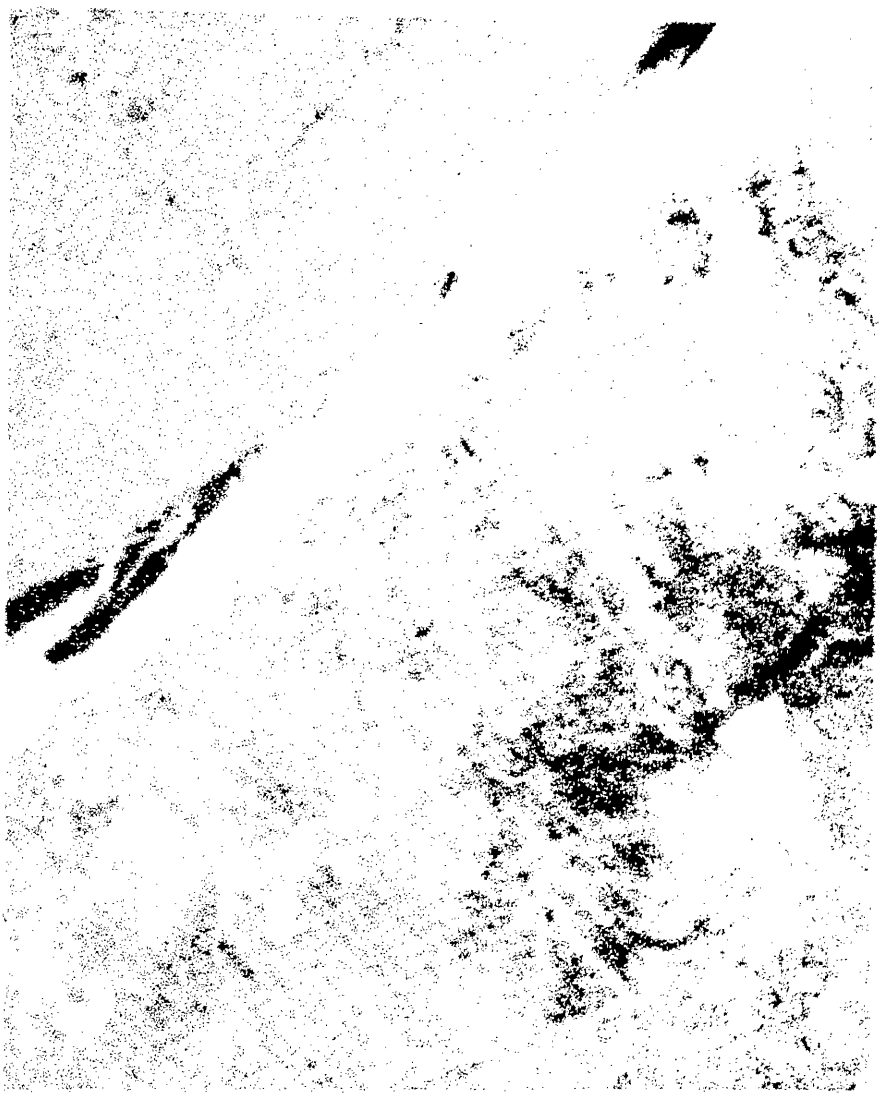
AREA & PERCENTAGE OF WASTELAND CATEGORIES DISTRICT ALLAHABAD

Type of Wasteland	Geographical Area in Sq. Kms.	Percentage of Geographical Area
Barren Rocky / Stony Waste / Sheet Rock Area	348.52	4.80
Land Affected by Salinity / Alkalinity	246.68	3.40
Water Logged and Marshy Land	64.21	0.88
Gullied and / or Ravinous Land	59.68	0.82
Sands	19.11	0.26
Underutilized / Degraded Notified Forest Land	4.04	0.06
Uplands With / or Without Scrub	3.28	0.04
Mining / Industrial Wasteland	1.25	0.02
Total	746.77	10.28

SOURCE : Mapping of Wastelands from Satellite Imagery, U.P., Allahabad District, 1988, RSAC-UP.

(i) Barren rocky / stony waste / sheet rock area :

This is the most prevalent and common category of wasteland which has emerged from the Vindhyan system of rock extending in southern part of Allahabad across the Yamuna river. There are two important patches of this type of wasteland. One patch is found between Bhatpuran to Bihara and between Bandhua to Jamuhra Bhat. The other patch is found towards the south of Tons river from the village Sujani Samodha to Meja town and from Manda to Kaurihar. This category of wasteland covers an area of 34852 hac. which is 46.67 percent of the total wasteland. This is quite unproductive area from the point of view of vegetation.



Part of Landsat 5 TM image of 23 February 1986 showing extensive rocky/stony waste (brownish yellow) south of Yamuna river in Allahabad district. Cultivated areas are seen in red.

Fig : 4.10

(ii) Land affected by salinity / alkalinity :

This category of wasteland is affected by salinity and covers an area of 24668 hac. (33.03 percent) of the total wasteland. This type of wasteland is found in the northern part of the river Ganga around Sirathu, Bharwari, Man, Jhanpur and Karari villages of Ganga-Yamuna doab. The patches of this type of wasteland are also found in Phulpur, Handia and Soraon tahsils.

(iii) Water logged and Marshy land :

This type of wastelands spreads over an area of 6421 hac which is 8.6 percent of the total wasteland in the study area. The main pockets of water logged and marshy wastelands are found in Soraon and Mauaima tahsil.

(iv) Gullied and/or Ravinous land :

These types of wasteland are found along the Ganga, the Yamuna and the Tons rivers. This category of wasteland has 5968 hac of area which is 8.0 percent of the total wasteland.

(v) Sands :

About 2.56 percent (1911 hac.) of the wasteland belongs to this category. These wastelands are also found along the rivers.

(vi) Under Utilized / Degraded Notified Forest Land :

This is one of the most sensitive wastelands which can be easily afforested. These are found in the eastern part of Meja tahsil and cover an area of about 404 hac. which is nearly 0.54 percent of the total wasteland.

(vii) Upland with/without scrubs :

This category of wasteland has very limited extent, yet it covers an area of 328 hac. which is nearly 0.44 percent of the total wasteland.

(viii) Mining / Industrial Wasteland :

These wastelands have come up mainly because of brick kiln. The demand for brick in the city of Allahabad has created this kind of wasteland. Such wastelands are located along the Allahabad-Jhansi road and Allahabad-Kanpur G.T. road. Nearly 0.17 percent (125 hac.) of the total wasteland in the study area belongs to this category.

III. Wetland :

The study of the dynamics of wetlands is very significant because it has very special type of ecology which needs to be conserved and preserved. The wetlands are the part of flood plains which have been the anchors of human civilizations. The wetlands, thus, help in preserving the natural heritage. Wetlands are basically of two types: natural and man made. The area under study has recorded 64 wetlands altogether - 51 natural and 13 man made. The spatial spread of wetland in the study area has been shown in the map (fig. 4.11). The different categories of wetland and the estimated area during pre-monsoon and post-monsoon has been shown in the table 4.12 and fig. 4.12 & 4.13.

Table : 4.12

TYPES AND AREA OF WETLAND
DISTRICT ALLAHABAD, 1991-1992

Types of Wetland	Name of Wetlands	No. of Wetlands	Wetland Area in Hec.	
			Pre monsoon	Post monsoon
Natural	Lake/Pond	13	1377.61	1377.61
Natural	Oxbow Lake	14	1514.49	1514.49
Natural	Surface Waterlogged Land	1	611.37	611.37
Natural	Swamp/Marsh	23	4251.23	4501.17
Manmade	Reservoir	1	136.10	136.10
Manmade	Tank	10	700.57	700.57
Manmade	Surface Waterlogged Land	2	224.48	224.48
Total		64	8815.85	9065.79

SOURCE : Wetland of Uttar Pradesh, 1991-1992, RSAC-UP.

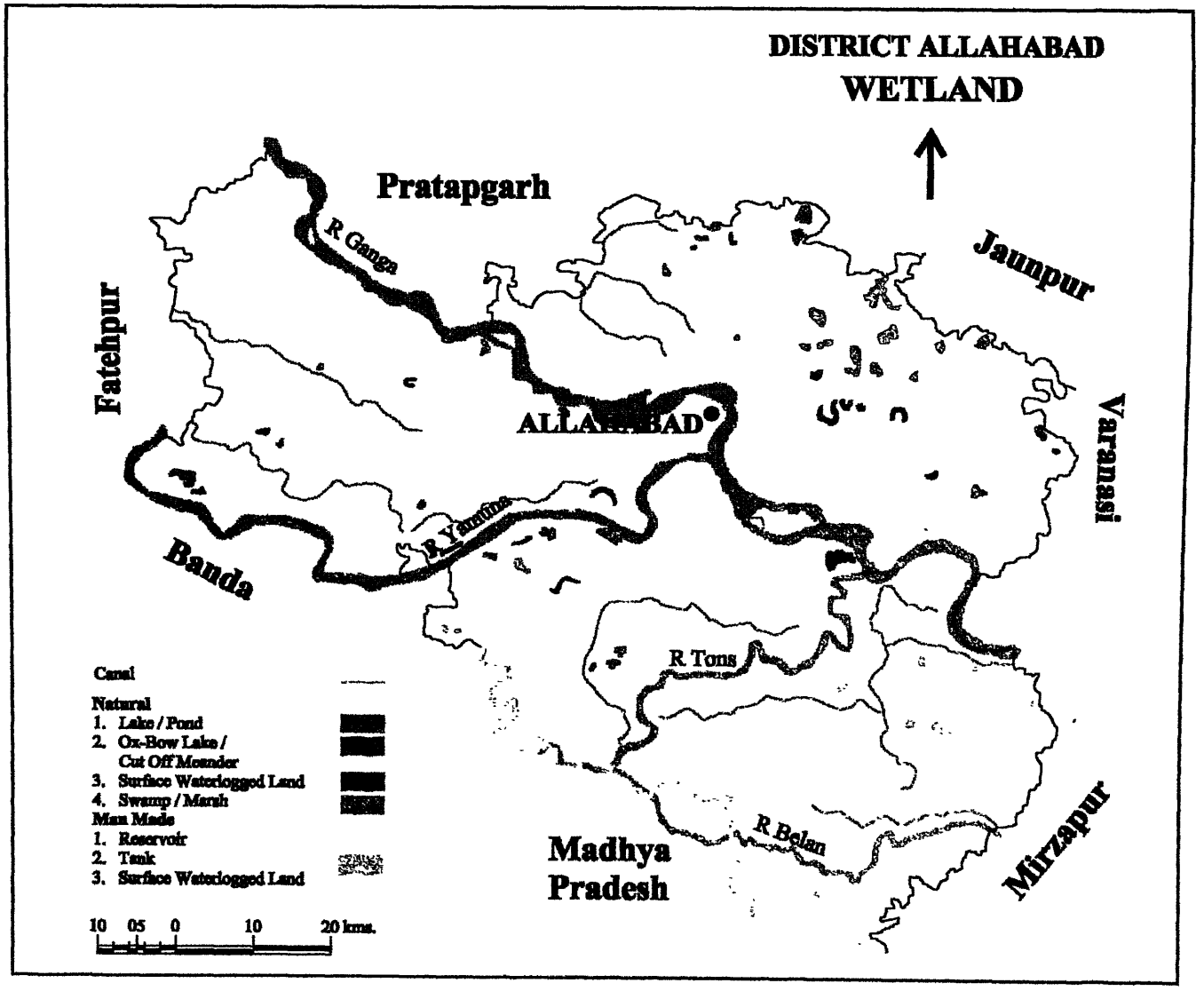
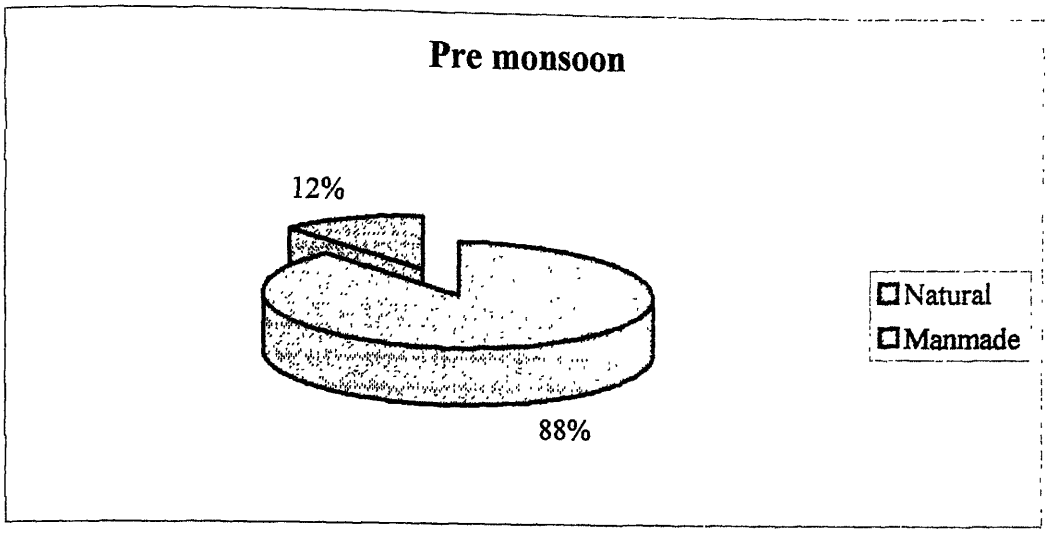

DISTRICT ALLAHABAD
WETLAND
Pratapgarh
R Ganga
Fatehpur
Jaunpur
Varanasi
ALLAHABAD
R Yamuna
Banda
R Tons
R Belan
Madhya
Pradesh
Mirzapur
Canal
Natural
1. Lake / Pond
2. Ox-Bow Lake / Cut Off Meander
3. Surface Waterlogged Land
4. Swamp / Marsh
Man Made
1. Reservoir
2. Tank
3. Surface Waterlogged Land
10 05 0 10 20 kms.

Fig : 4.11

AREA OF WETLANDS, DISTRICT ALLAHABAD, 1990-1991



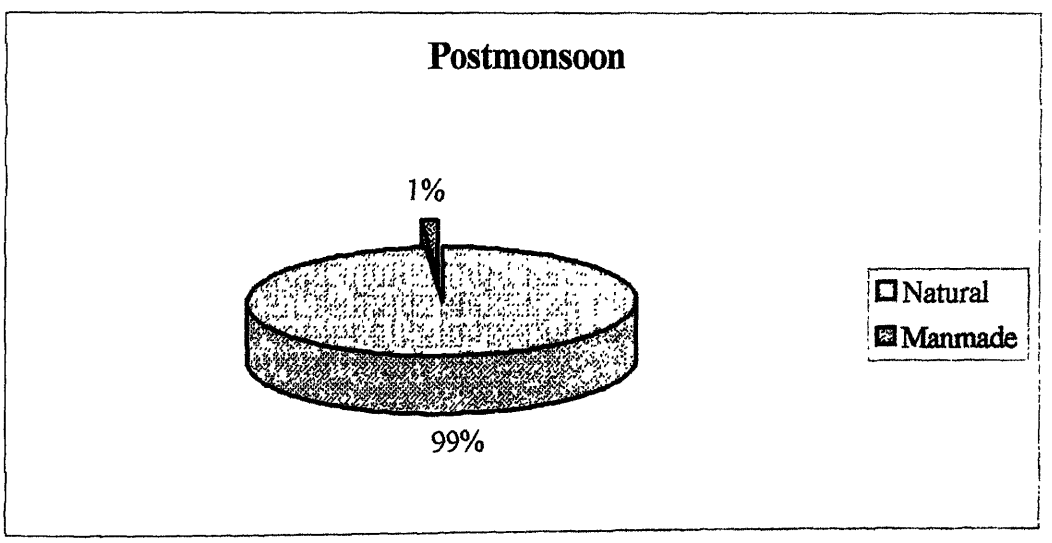
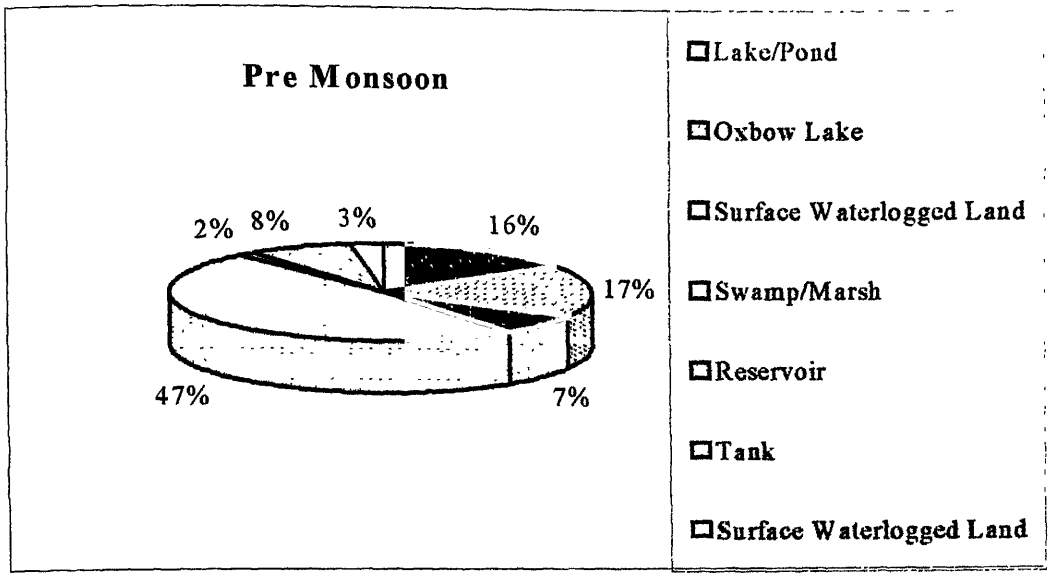


Fig : 4.12

AREA OF WETLANDS, DISTRICT ALLAHABAD, 1990-1991



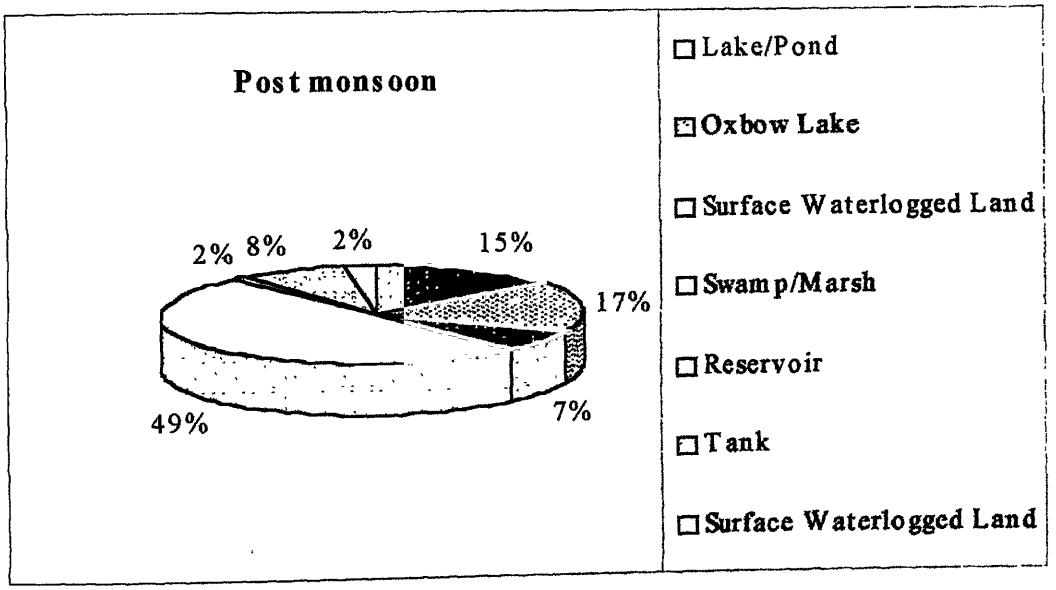


Fig : 4.13

The wetlands cover nearly 9000 hac. of land. The largest area is occupied by swampy / marshy land followed by ox-bow lakes and lakes & ponds. The surface waterlogged land (both natural and man-made) are also quite significant. There are 10 tanks which are man made and occupy an area of 7000 hac. These wetlands are rich in different kinds of wild life and plant species and, therefore, need some protective measures.

4.4. Human Perception and Behavioural Environment :

The man-environment relationship is not a two way process. It is quite complicated because man is not always an economic man. Quite often he is a satisficer (Misra, 1989). There are two types of environment-phenomenal (physical or and built environment) and behavioural or perceptual environment (Kirk, 1951). The behavioural environment is framed by man in the phenomenal environment through his perceptual behaviour such as belief, sentiment, notion, emotion and prevailing value system. The filters of language, ethical values and culture prepare space-time prism which helps in carving out the behavioural environment. It is in this behavioural environment that man takes decision which are often at sub-optimal level. The study of this behavioural dynamics is, therefore, quite significant in understanding the processes involved in decision making of individuals and groups. The analysis and interpretation of decision making process helps in better management of environment and development.

In order to study the behavioural dynamics of environment and development in the area under study 15 villages spread over the entire area in different ecological settings have been selected randomly. The location and population of the randomly selected villages has been presented in the table 4.13 (fig. 4.14).

Table : 4.13

DATA BASE FOR BEHAVIOURAL PERCEPTION

Sample Selected Villages	Ecological Region	No. of Households	No. of Households Selected for Perception (20 Percent Sample)
Udhin Khurd	Ganga Yamuna Doab (Flood)	340	68
Bodhari Uparhar	Ganga Yamuna Doab	324	64
Sarswatipur urf Kaudihar	Trans Ganga Tract (Flood)	438	87
Raiya	Trans Ganga Tract (Flood, Wetland)	342	68
Mailaha	Trans Ganga Tract (Flood)	166	33
Kanehati	Trans Ganga Tract (Flood, Wetland)	440	88
Karanpur	Trans Ganga Tract (Flood, Wetland)	205	41
Bhopatpur	Trans Ganga Tract	127	25
Madanpur	Trans Yamuna Tract (Wetland)	159	31
Khojwa Baid	Trans Yamuna Tract (Flood)	43	8
Rera	Trans Yamuna Tract (Flood)	207	41
Barauli	Trans Yamuna Tract (Flood)	285	57
Sandwa Kalan	Trans Yamuna Tract (Flood)	310	62
Goraiya Kalan	Trans Yamuna Tract (Flood, Wetland)	139	27
Manda Khas	Trans Yamuna Tract (Flood, Wetland)	1106	221

Source : Field Work, 2000.

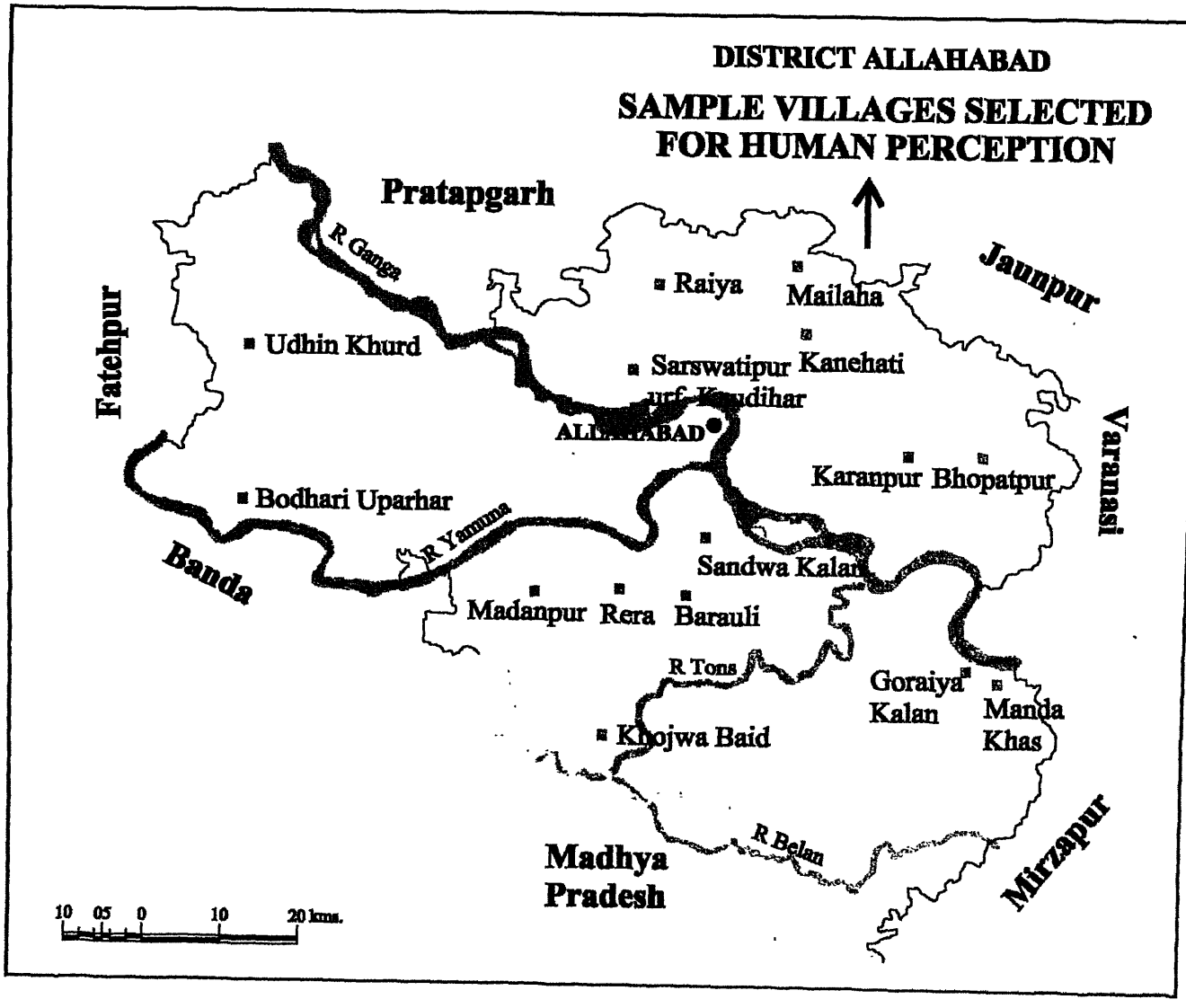

DISTRICT ALLAHABAD
SAMPLE VILLAGES SELECTED
FOR HUMAN PERCEPTION
Pratapgarh
R Ganga
Fatehpur
Udhin Khurd
Raiya
Mailaha
Jaunpur
Sarswatipur Kanehati
urf Kaudihar
ALLAHABAD
Karanpur
Bhopatpur
Varanasi
Bodhari Uparhar
R Yamuna
Banda
Sandwa Kalan
Madanpur
Rera
Barauli
R Tons
Goraiya
Kalan
Manda
Khas
Khojwa Baid
R Belan
Madhya
Pradesh
Mirzapur
10 05 0 10 20 kms.

Fig : 4.14

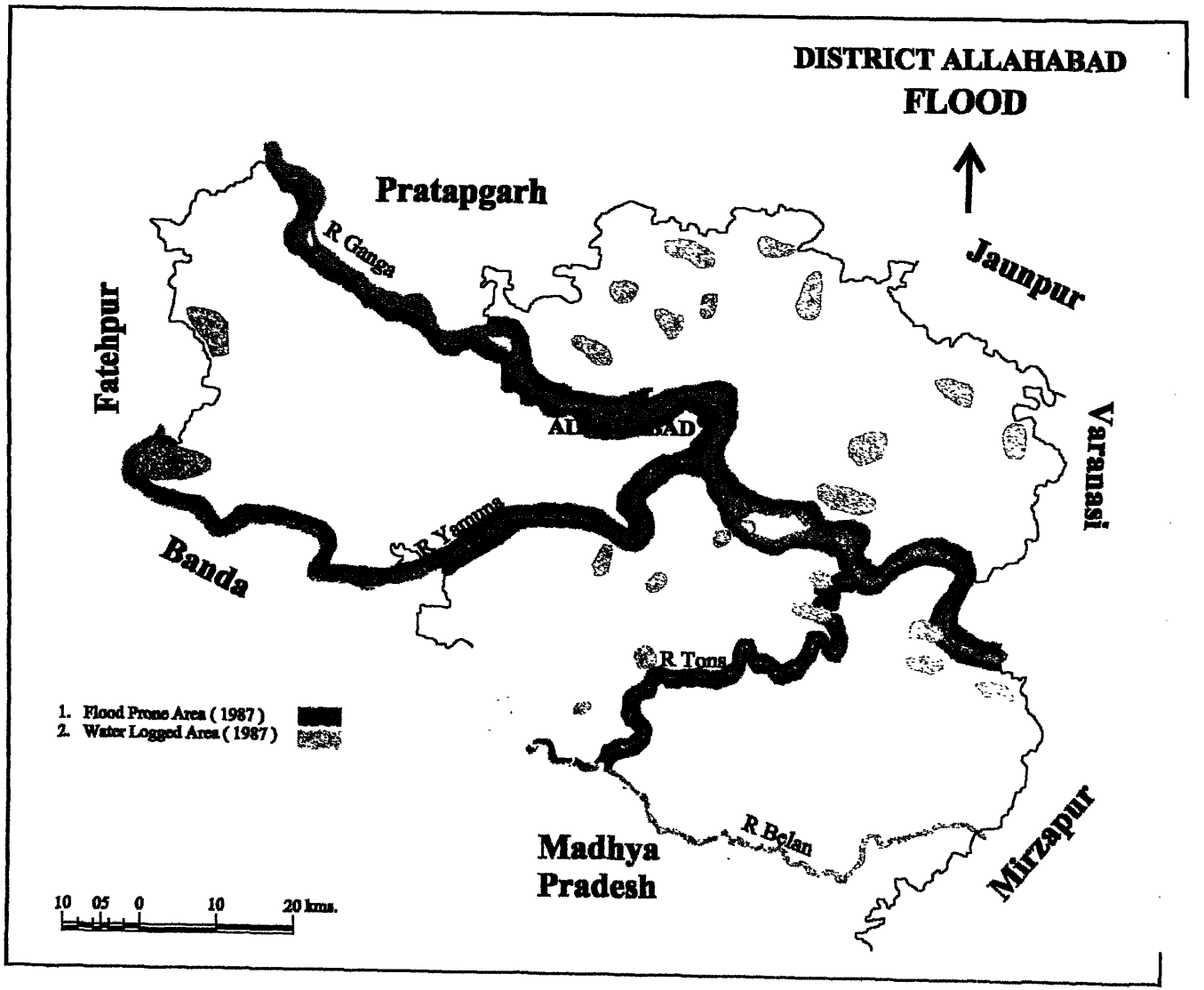

DISTRICT ALLAHABAD
FLOOD
Pratapgarh
R Ganga
Jaunpur
Fatehpur
Varanasi
Banda
R Yamuna
R Tons
1. Flood Prone Area (1987)
2. Water Logged Area (1987)
Madhya Pradesh
R Belan
Mirzapur
10 05 0 10 20 kms.

Fig : 4.15

The study of people's perception regarding different aspects of environment was done by asking questions about deforestation, flood hazards, soil erosion, state of common property resources and the state of biodiversity from the population living in the listed villages. The result so obtained from the questionnaires / interviews was tabulated. The analysis of the result reveals that deforestation has been a common feature in almost all the sample villages. This is also clear that the deforestation has several associated problems such as shortage of fuel, fodder, wood and timber besides environmental degradation. The average annual temperature over the period of time has increased as it was revealed by the households. The effect of flood hazards (fig. 4.15) is confined only along the river course and this does not seen to be a serious problem. Besides, the village household know how to manage this temporary environmental problem. For this reason alone, people do not considered this as a problem beyond control. The local technology and information possessed by the villagers is good enough to manage the flood havoc. Drought on the other hand is rated as a very serious problem because the shortage of water adversely affects the agricultural productivity. Soil erosion does not pose serious problem in the area under study. However, almost all the household are of the view that the common property resources which were being used to maintain the ecological balance have been disappearing very fast. This has also resulted into loss of bio-diversity. The wetlands which are supposed to be sensitive land-water ecological systems have suffered great loss due to encroachment as well as pollution.

References :

Berry, B.J.L., 1961 : Basic Patterns of Economic Development, In *Atlas of Economic Development* (ed. N. Ginsburg), Chicago : University of Chicago Press, 110-19.

Coates et al., 1977 : *Geography and Inequality*, Oxford, : Oxford University Press, 5.

Harvey, D.W., 1971 : Social Process, Spatial Form and the Redistribution of Real Income in an Urban System. In *Regional Forecasting* (eds. M. Chisholm, A.E. Frey, and Haggett P.), London : Butterworth, 270-300.

Harvey, D.W., 1973 : *Social Justice and the City*, London : Arnold.

Kirk, W., 1951 : Historical Geography and Concept of the Behavioural Environment, *Indian Geographical Journal*, Silver Jubilee Volume, 152-60.

Misra, H.N., 1989 : Traditional and Contemporary Paradigms of Urban Geography, *Annals, The National Association of Geographers India*, Vol. 9, No. 1, 49-58.

Myrdal, G.M., 1957 : *Economic Theory and Under-Developed Regions*, London : Duckworth.

RSAC, UP, 1988. *Mapping of Wastelands from Satellite Imagery, Uttar Pradesh, Allahabad District*, Lucknow, 2.

Smith, D.M., 1972 : Towards a Geography of Social Well-Being : Inter State Variations in the United States, *Antipode Monogr. Soc. Geogr.*, Vol. 1, 17-46.

United Nations Research Institute for Social Development, 1966 : *Social and Economic Factors in Development*, Report No. 3, U.N.R.I.S.D., Geneva.

Chapter 5

SUSTAINABLE DEVELOPMENT PLANNING

The previous chapter focussed on the environmental degradation, pollution, human perception and the status of development at block level. This chapter aims at suggesting the development plan of action at sectoral and spatial level. The purpose is to suggest the sustainable development plan for eco-friendly development in the study area.

5.1. Conceptual Background :

The concept of sustainable development has already been discussed in chapter 1. The integrated mission for sustainable development model initiated by the department of space in 1987 presents the basis for turning the concept of sustainability into development plan of action. The IMSD model has been presented in the fig. 5.1. The basic idea of this model is to maintain the balance between productivity and ecological set-up. Undoubtedly, the productivity beyond the level of resistance is bound to set in the state of degradation in the environmental resources in the long run. However, the intervention of the innovative technology may help in balancing between production function and natural environment. The IMSD model helps to prepare the database which may be useful in addressing the developmental issues. The ever increasing population and its felt need of production can be achieved only if the sustainable development model takes into account the parameters proposed in the Integrated Mission for Sustainable Development (IMSD) model.

In the present analysis two types of approaches of planning have been suggested : (a) Eco-development planning for tackling the sensitive environmental issues and (b) spatio-functional planning for over-all development of the study

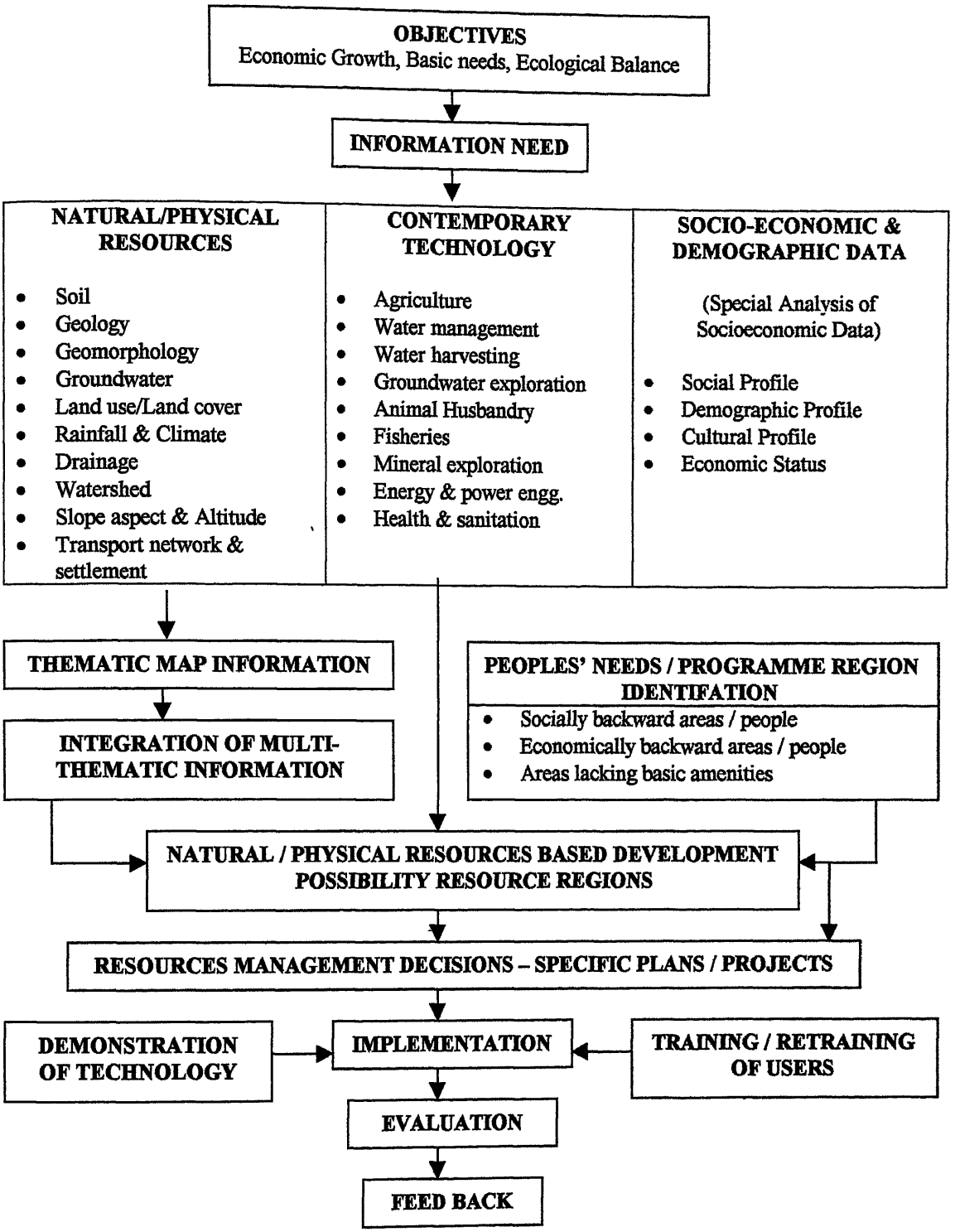


Fig : 5.1 CONCEPTUAL FRAMEWORK OF IMSD

Sources : IMSD Technical Guidelines, NRSA, Hyderabad.

area.

5.2. Eco-Development Planning :

There are several sectors of economy which play seemingly significant role in the socioeconomic development. It is also established that economic upliftment has great bearing on social development. The economic planning is therefore critical in the development planning. From the previous analysis it is clear that land is the basic resource base and agriculture has been playing the dominant role in the sustenance of population which has been continuously increasing. The planning of agriculture in relation to land, water and soil has assumed great importance. The study area has been divided into 10 hydrogeomorphological units. Each hydrogeomorphological unit has its own specialty in terms of land, water and soil. The efficient crop management technology, alternate landuse system according to the land capability and conservation management and development of soil and water resources may lead to sustained agriculture production to meet diverse requirement of farm household while preserving the resource base and maintaining the high environmental quality. A sustainable farming system needs to satisfy the following conditions :

1. Landuse should be based on the capability and characteristic of land.
2. The agriculture practice and production should be diversified so that economic returns are high and failure of risk are distributed.
3. The risk of soil degradation and problems of environment should be minimum.

The agriculture of the study area is characterized by the following :

1. Landholdings are small and larger number of households belong to the category of small and marginal farmers.

2. The number of small and marginal farmers is increasing due to fragmentation of holdings for social and economic regions. The increasing trend of nuclear families and the migration of people from rural to urban areas have been the main causes for the redistribution of land holdings.
3. The greater concentration of the farmers in the study area is on producing food crops such as rice and wheat.
4. The diversification and commercialization of agriculture is picking up only slowly. The pulses, potato, sugarcane, oilseeds and vegetable have good potential to grow but this has not been attracting the attention of the farmers due to lack of diffusion of innovation and poor irrigational facility. This situation needs to be improved.

The hydrogeomorphological units which need special attention are alluvial-plain with salt encrustation, ravinous land, moderately weathered burried pediplain, deeply weathered burried pediplain, dissected plateau, and backswamp. These are ecologically sensitive geographical areas which need to be planned carefully for increasing the farm production. The agro forestry and social forestry need to be introduced in these areas in order to arrest the soil erosion, protect flora and fauna, meet fuel and fodder requirements and improve the per capita income.

The environmental planning of wet and wasteland is very important (Chattopadhyay, 1995 and Marks, 1993). In the study area the wasteland is spread over an area of 10.28 percent of the total geographical area. There is need to plant some special trees on the wasteland. The concept of energy plantation may be implemented to develop the wasteland. The basic idea behind this concept is to plant trees on wasteland to meet the shortage of food, fodder and fuel. The

wasteland caused due to water logging, mining and brick kilns may be used for fishing or pisciculture. There are several water resistance plants which may be grown around these areas. The alkalinity is one of the major problems in the wasteland areas of the district. The plants tolerating the alkalinity may be grown over here. The wetland areas may be used to develop small sanctuaries which have great potential in the study area. These problems of planning can be tackled by dividing planning either at the hydrogeomorphological units or at the watershed level. The watershed planning, of late, has assumed great importance because it provides the best integration of soil, water and vegetation (Misra, 2000). The sustainable development of watershed developed by Misra (2000) may be quite useful in the social, economic and environment friendly development of the study area. This model takes care of all the possible parameters of environmental planning (see fig. 5.2).

The contemporary development is dependent upon the industrial growth and development. Agriculture alone cannot support the increasing population. It needs to be supplemented by some big industries, several small scale industries and many cottage industries based on the resources available within the region. From the previous analysis it is clear that the location and development of industrial units at block level is highly skewed. The blocks which need the special attention in this regard are Kara, Sarsawan, Kaushambi, Kaudhiyara and Holagarh.

The large scale industries are located in Allahabad and couple of small towns such as Phulpur and Mauaima. However, new industries are not coming up even in Allahabad due to labor problem specially due to poor work culture. The industries which have great potential to take off are agro based and food

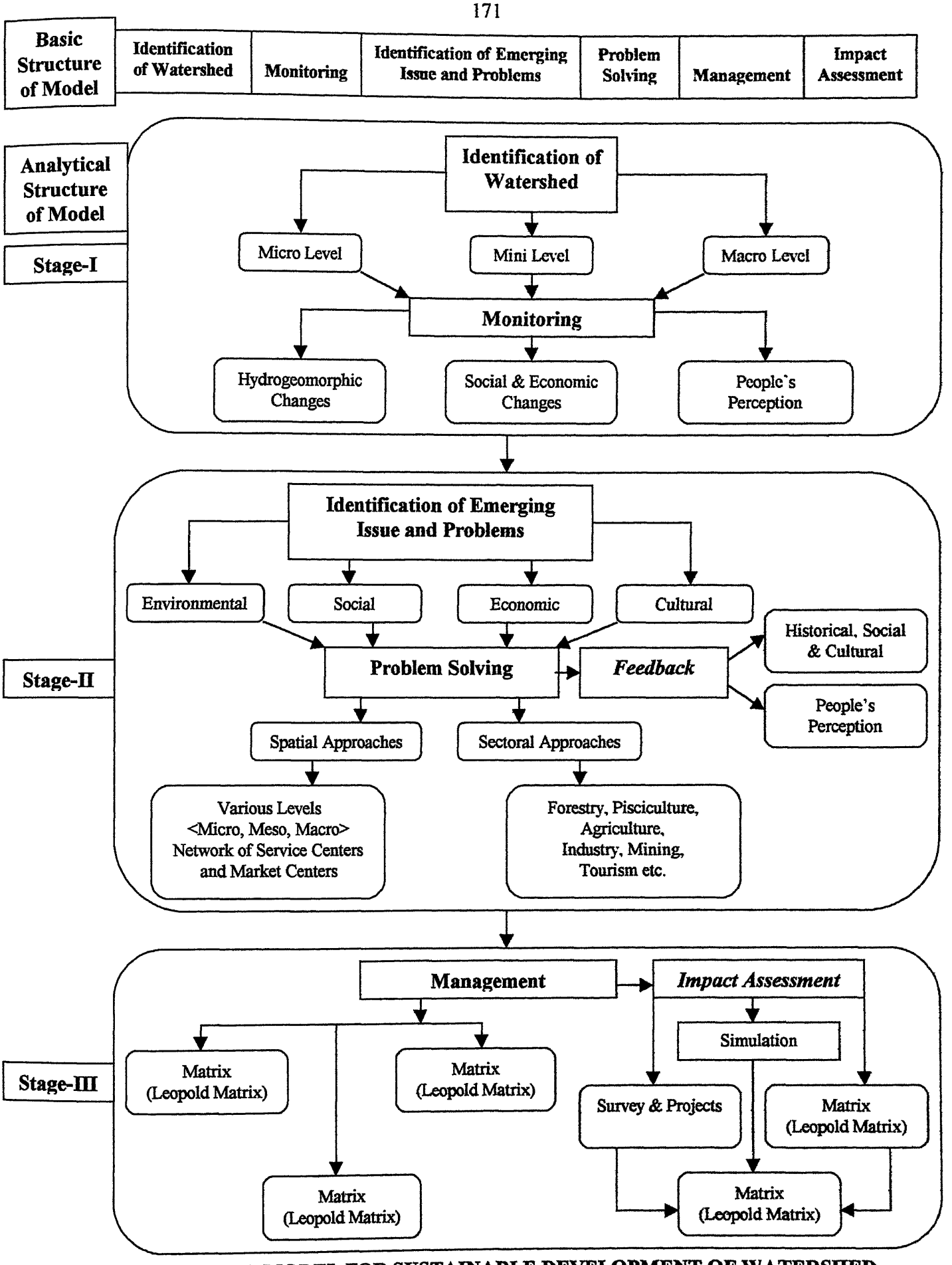


Fig : 5.2 A MODEL FOR SUSTAINABLE DEVELOPMENT OF WATERSHED

Source : Environmental Monitoring and Management of Watersheds, Misra, H. N., 2000.

processing industries. The mining industry has also good scope for development in Meja, Karchhana and Shankargarh areas. There is need to develop industrial nodes-at least one in each block. These industrial nodes may eventually develop through multiplier effect. Allahabad district is basically a food surplus area and therefore there is a need for food storage facility. There are only 30 cold storages as at present. The different kinds of facilities pertaining to agriculture and food production are presented in the table 5.1. From this table it is evident that the facilities are not in consonance with the demand. A note of caution may, however, be exercised regarding the industrial pollution which may emerge as a greater threat to the environment.

All planning may be set at naught if population planning is not persuade vigorously. In this context education in general and female education in particular may be catalytic. The female education is very low in the study area. It varies between 6.4 percent to 22.3 percent at black level. While taking care of young and adult population the problem of aged population also needs to be addressed.

Planning without infrastructural facilities cannot be successful. Some of the existing infrastructural facilities have already been discussed in previous chapter. The service center planning or the spatial planning which is basically spatio-functional organization may help improve the infrastructural facilities.

5.3. Spatio-functional planning :

This is basically a service center planning strategy. The service centers are the central places which cater to the need of their surrounding countryside by providing social, economic, cultural and other necessary facilities. The service centers provide horizontal linkages, help in the diffusion of innovation and thereby herald in socioeconomic transformation. They, thus, help in the regional

Table : 5.1

AGRICULTURAL FACILITIES, DISTRICT ALLAHABAD, 1996

Dev. Block	Seed Store & Fertilizer Depo	Rural Storehouse	Pesticide Depo	Seed's Enhancement	Cold Storage	Agriculture Service Center	Agricultural Production Mandi Samiti	Gobar Gas Plant
Kara	10	12	1	1		4		169
Sirathu	10	10				3		375
Sarsawan	7	8	1	1		1		163
Manjhanpur	8	12				1		160
Kaushambi	8	10	1			1		171
Muratganj	8	7	1	1		1		189
Chail	11	11	1		1	4		149
Nevada	7	12	1			1		183
Kaurihar	10	12	1		2	1		202
Holagarh	10	11	1			1		322
Mauaima	8	14			1	1		205
Soraon	10	11	1		4	5		324
Baharia	10	13	1			4		157
Phulpur	9	10				6		346
Bahadurpur	8	19	1		3	14		264
Pratappur	13	10	1			3		205
Saidabad	9	11	1			3		286
Dhanupur	10	10	1			1		428
Handia	8	10			1	6		249
Jasara	10	8	1			1	1	86
Shankargarh	9	11				3		97
Chaka	9	3	1		1	3		191

Karchhana	9	9	1			1		184
Kaudhiyara	3	6	1					112
Uruwan	8	7	1			2		200
Meja	8	10			1	1		141
Koraon	8	11	1	1		10		123
Manda	8	9	1			2		115
Total Rural	246	287	21	4	14	84	1	5796
Total Urban	16		8		16	15	3	
Total District	262	287	29	4	30	99	4	5796

SOURCE : District Statistical Bulletin, 1997.

development process. This is, therefore, considered an important strategy of development. The fact that there is a greater emphases on multilevel planning (Sundaram, 1977), the hierarchical order of service centers may help in strengthening the socioeconomic transformation processes at district, tahsil (sub-divisions) and block levels. The service center strategy is basically the outcome of the classical models of cristraller's Central place (Christraller, 1966) and Perroux's growth Pole theory (Perroux, 1955). There is good literature on service center dealing with the concepts of central places, range of goods, concept of threshold, shapes of service areas and hierarchical structures (Berry & Garrison, 1958, Mayfield, 1967, Misra, K.K., 1981 and Misra, 1987). Based on the size and functions four tier hierarchy of service centers has been suggested which have been presented in two types of models-one is theoretical (see fig. 5.3) and other is operational (see fig. 5.4). The city of Allahabad ranks first in size as well as functions. It has been designated as a regional capital. This provides accessibility and linkages to the entire area in view of its administrative and socioeconomic facilities. The second order is occupied by the urban centers and tahsil headquarters. These centers have all the medium and lower level services besides being the sub-divisional headquarters. These may designated as sub-regional centers or growth centers.

The third order centers are those market villages who's population is 2000 and above. There are 287 such rural service centers which may act as growth points. These are the local centers which have close linkages with villages which

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Note : the author is aware of all the methodological derivative in selecting the service centers. But in this study only data based on field survey and census information has formed the basis for determining the central places and their hierarchy. This was found to be more realistic.

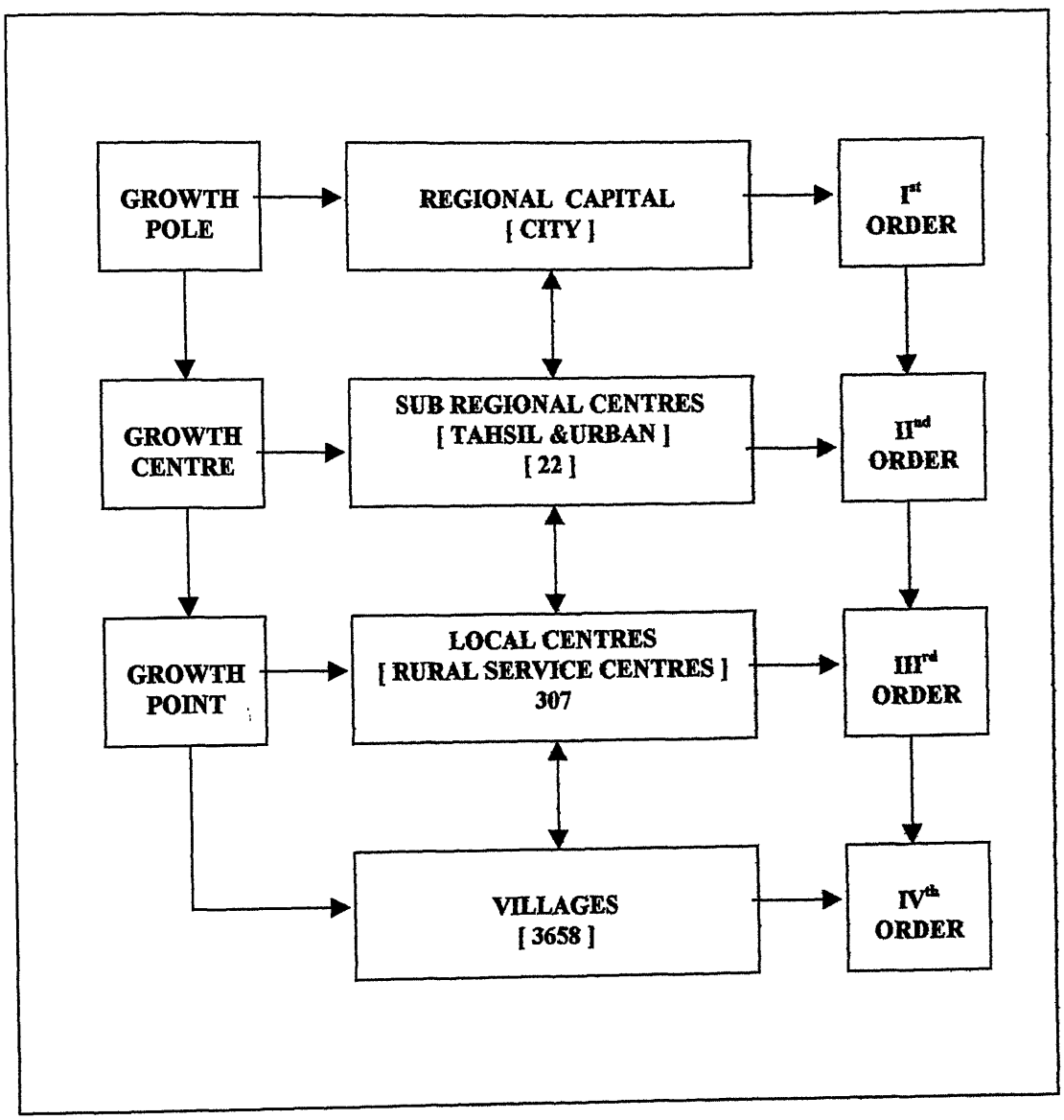

Fig: 5.3 **HIERARCHICAL MODEL OF CENTRAL PLACES**

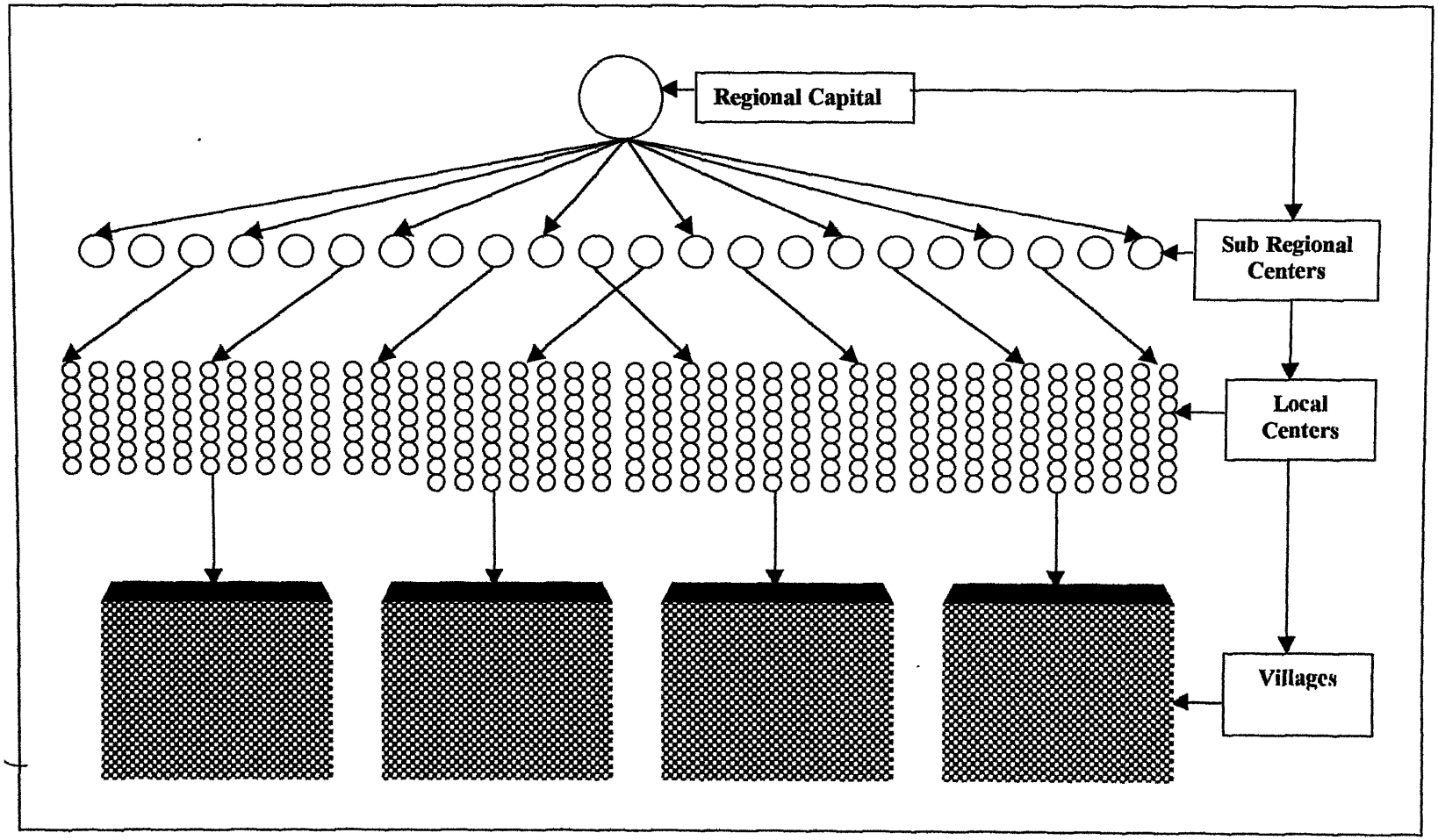

Fig : 5.4 OPERATIONAL MODEL OF CENTRAL PLACES

are at the bottom of the hierarchy (see table 5.2 and fig. 5.5).

There are four areas in the trans-Yamuna belt where there are no adequate linkages available. These are Shankargarh, Meja, Mande and Koraon. The list of villages which need to be developed as local centers has been presented in table 5.3 (see fig. 5.6).

Table : 5.2

SELECTED LOCAL CENTRES, DISTRICT ALLAHABAD

Tahsil	Dev. Block	Local Centers	Population 1981	Population 1991 (App.)
Sirathu	Kara	Koreon	3624	4458
		Afzalpur Saton	2996	3685
		Sauraibuzurg	5238	6443
		Paras	2304	2834
		Kanwar	3056	3759
		Dhumai	2518	3097
		Sayara Mithepur	2863	3521
		Chak Chamru	2484	3055
		Sewadkhat	3487	4289
		Sipah	2159	2656
		Gandpa	3429	4218
		Shahzadpur	4312	5304
		Sisampur Parsakhi	2035	2503
		Andawan	2006	2467
	Sirathu	Sankha	2870	3530
		Rampur Dhamawan	3468	4266
		Taibabur Shamshabad	2365	2909
		Govindpur Goreon	2399	2951
		Bamharauli	3147	3871
		Bidanpur Kakorha	2111	2597
		Kashia	3629	4464
		Chamandha	2688	3306
		Kohkhraj	5575	6857
		Bisara	2943	3620
		Afzalpurwari	2980	3665
		Mohabbatpur Painsa	2366	2910
		Mohabbatpur Anetha	3048	3749
		Nara	3378	4155
		Ajhua t. a.	8470	11803
		Sirathu t. a.	6149	9088
Manjhanpur	Sarsawan	Uno	2305	2835
		Alai	2532	3114
		Sarsawan	3511	4319
		Andhawa	4896	6022
		Alawara	2378	2925
		Mahewa	2275	2798
		Katari	2150	2645
		Paschhim Sarira	5334	6561
		Purab Sarira	7402	9104
		Jafarpur Mahawan	2407	2961
		Gorajoo	3296	4054

	Manjhanpur	Thabha	2652	3262
		Shah Alamabad	3067	3772
		Tewa	2163	2660
		Osa	3289	4045
		Pata	2188	2691
		Asadha	2881	3544
		Pindara Sahawanpur	2393	2943
		Karari t. a.	7121	9151
		Manjhanpur t. a.	6567	8687
	Kaushambi	Raksawara	2404	2957
		Meohar	4992	6140
		Bindow	3350	4121
		Raksarai	2845	3499
		Kosam Inam	3072	3779
		Kosam Khiral	2582	3176
		Kanaili	3682	4529
		Jurajpur	2081	2560
		Berouncha	2598	3196
		Sarai Aqil t. a.	9435	11821
Chail	Muratganj	Palhana	2551	3138
		Pattl Narwar	2316	2849
		Narna	2166	2664
		Dhanni	2207	2715
		Kashiya	4080	5018
		Rohi	2736	3365
		Mohammadpur	2195	2700
		Parsara	2122	2610
		Shamashpur	2569	3160
		Kaju	3617	4449
		Rasulpur Badle	2085	2565
		Patte Parwezabad	2890	3555
		Sikandarpur Bajhan	2286	2812
		Mahgaondeh Mafi	3627	4461
		Sayad Sarawan	6127	7536
		Muratganj t. a.	9571	11085
	Chail	Charwa	11304	13904
		Balipur Tata	2532	3114
		Jalalpur Sana	2207	2715
		Mohammadpur	2088	2568
		Bahika	4993	6141
		Manauri	4305	5295
		Ujihini patti	2036	2504
		Tikri	2222	2733
		Akbarpur Sallahpur	2058	2531
		Ahmadpur Pawan	3959	4870
		Bamarauli	9124	11223

		Ahmadpur Asrauli	2511	3089
		Umarpur Niwa	2991	3679
		Kathula Ghauspur	3742	4603
		Shash	3789	4660
		Chail t. a.	4664	6123
		Allahabad u. a.	646493	844546
	Nevada	Khijirpur Kailai	2090	2571
		Basuhar	3560	4379
		Bhagwanpur	2105	2589
		Ghosiya	2397	2948
		Khopa	2888	3552
		Panra Gopalpur	3090	3801
		Pur Khas	3404	4187
		Tilhapur	3380	4157
		Audhan	2731	3359
		Sewadha	2731	3359
		Sewadha	2052	2524
		Asraway Khurd	2083	2562
		Baxi Mondha	2734	3363
		Karehda	2313	2845
Soraon	Kaurihar	Piyri	2235	2749
		Singror	3525	4336
		Anapur	2266	2787
		Samhai	2167	2665
		Mansurabad	2070	2546
		Mendara	3789	4660
		Ulda	2530	3112
		Athrampur	2318	2851
		Adampur	2669	3283
		Kanjiya	2188	2691
		Sarswatipur	2190	2694
		Chaphari	2042	2512
		Hthaga	2789	3430
		Mohammadpur	2850	3506
		Malak Harhar	3462	4258
		Nindura t. a.	13114	19296
	Holagarh	Madumpur Ramnagar	2052	2524
		Purabnara	3938	4844
		Dahiyanwa	3174	3904
		Makundpur	2778	3417
		Kaliyanpur	3932	4836
		Umriabadal	2119	2606
		Chaubara	2066	2541
		Barai Harkh	3469	4267
		Serawan	3293	4050
		Sultanpur Akbarpur	2247	2764

	Mauaima	Sisawan	2005	2466
		Banka Jalalpur	2953	3632
		Alawalpur	2198	2704
		Ramnagar Gansiyari	2227	2739
		Ghinpur	4300	5289
		Maudostpur	2228	2740
		Mauaima	2634	3240
		Mohronda	2801	3445
		Chhete Mau	2336	2873
		Gadhina	2321	2855
		Abdalpur	2619	3221
		Bara Gaon	2013	2476
		Mauaima t. a.	10053	13167
	Soraon	Lakhanpur Kandu	2666	3279
		Sarai Lalkhatum	2338	2876
		Soraon	4599	5657
		Gohari	5569	6850
		Sewaith	4144	5097
		Morahu	3215	3954
		Rangpura	2120	2608
		Kursand	2744	3375
		Jatwar	2913	3583
		Pandila	2251	2769
		Tharwai	3335	4102
Phulpur	Baharia	Chhata	2599	3197
		Kahali	2657	3268
		Sisaisipah	2104	2588
		Jugunideeh	2732	3360
		Fajalabad	2605	3204
		Ramgarh Kotari	2002	2462
		Nurpur	2727	3354
		Kusungur	2189	2692
		Paigampur	2007	2469
	Phulpur	Kapsa	2534	3117
		Bamai Hushanganj	2150	2645
		Sawandeeh	2931	3605
		Sarai Abdul Malik	2358	2900
		Tardeeh	3163	3890
		Kanehati	2201	2707
		Chandaula	2573	3165
		Phulpur t. a.	11793	16767
	Bahadurpur	Sherdih	2192	2696
		Malawan Bazurg	2895	3561
		Sahson	2606	3205
		Malawan Khurd	2429	2988
		Andawan	2468	3036
		Jhui Khas	2907	3576

		Kanihar	3044	3744
		Sarai Lahur	2170	2669
		Shudnipur Kalan	2223	2734
		Kotwarupur	3168	3897
		Malkanpur	2928	3601
		Dhokari	4719	5804
		Kotawa	7595	9342
		Dubalwal	4780	5879
		Jhunsi t. a.	4567	7943
Handia	Pratappur	Piauna	2174	2674
		Ugrasenpur	2588	3183
		Kanpur	2296	2824
		Saron	3439	4230
		Nedula	3206	3943
		Bajati	2658	3269
		Janghai	3556	4374
		Chanethu	2099	2582
		Chhatauna	3491	4294
		Muhiuddinpur	2906	3574
	Saidabad	Arakala	2975	3659
		Sithauli	2076	2553
		Jalalpur Kasba	2803	3448
		Fatuha	3581	4405
		Kohara	2371	2916
		Barethi	3706	4558
		Binda Chak Mukim	2176	2676
		Chak Binda	2085	2565
		Bajaha Misran	2524	3105
		Ganeshipur	2208	2716
		Dumduma	3163	3890
	Dhunupur	Masari	2374	2920
		Kiranwa	3388	4167
		Jaranwa	2043	2513
		Jadishpur	2060	2534
		Dhobaha	2223	2734
	Handia	Upardaha	3344	4113
		Jaguwa Sodha	2719	3344
		Asawadaudpur	2033	2501
		Bamaila	2826	3476
		Kasoa Dhan	2718	3343
		Telakhas	3915	4815
		Baroat	3854	4740
		Bhitee	3279	4033
		Handia t. a.	8939	13000

Jasra	Shankargarh	Nimi	2408	2962
		Deora	2506	3082
		Pandua	1054	1296
		Nauriha Tarhar	1269	1561
		Amilia Tarhar	1725	2122
		Othgi Tarhar	1240	1525
		Majhiari Amad	1309	1610
		Manpur	1035	1273
		Bela Mundi	1528	1879
		Chhatahara Ghuretha	1908	2347
		Basahra Tarhar	1811	2228
		Tikari Kalan	1103	1357
		Chhiri	1736	2135
		Bara Khas	1495	1839
		Laund Kalan	1026	1262
		Lohagara	1813	2230
		Bihariya	1132	1392
		Sheorajpur	1223	1504
		Nauriha	1161	1428
		Sidhtikar	1055	1298
		Shankargarh t. a.	6882	10662
	Jasra	Chilla Gauhani	2411	2966
		Kanjasa	2153	2648
		Jasra	2852	3508
		Kanti	2911	3581
		Jari	2742	3373
Karchhana	Kaudhiyara	Karma	5093	6264
		Kareha	2886	3550
		Naugawan	2457	3022
		Akorha	3880	4772
		Deora	2804	3449
		Kulma	2344	2883
	Chaka	Iradatganj	2220	2731
		Basawar	2673	3288
		Mahewa patti	2204	2711
		Arail	4483	5514
		Chak Babura	2525	3106
		Chheonki	2104	2588
		Chak Imam Ali	3510	4317
		Mawaiya	2476	3045
		Pura Pande	3134	3855
		Lawain Kalan	3202	3938
		Tilakhwar	2046	2517
		Ubhari	2727	3354
		Balapur	2396	2947
		Purwa Khas	2027	2493
		Hathigan	2647	3256

	Karchhana	Semari Taluka Purwa	2143	2636
		Mungri	4569	5620
		Karchhana	2223	2734
		Bendo	2443	3005
		Dih	4973	6117
		Basahi	2745	3376
		Babura	2591	3187
		Panasa	5293	6510
		Sonai	2045	2515
		Khain	3268	4020
		Baraon	2816	3464
		Bhunda	2617	3219
		Dharwara	3478	4278
		Arail	2335	2872
Uruwan	Uruwan	Upraunda	4414	5429
		Samhan	3065	3770
		Kathauli	3322	4086
		Soraon Panti	2359	2902
		Chhatwa	2740	3370
		Ramnagar	6129	7539
		Unch Dih	3245	3991
		Paranipur	4102	5045
		Pakri Sewar	2040	2509
		Doharia	2028	2494
		Madra Mukundpur	2475	3044
		Jawania	2291	2818
		Onaur Kachhar	2518	3097
		Aunta	3813	4690
		Amilika Kalan	3085	3795
		Sirsa t. a.	7343	8929
	Meja	Kohandar	2455	3020
		Meja Khas	3005	3696
		Lotarh	2129	2619
		Newadhiya	2765	3401
		Sujani Samodha	1196	1471
		Itwa Kalan	1260	1550
		Silaudhi Kalan	1516	1865
		Chand Khamaria	1733	2132
		Shahpur Kalan	1022	1257
		Isauta	1036	1274
		Mamoli	1016	1250
		Hardiha	1162	1429
		Bhaiya	1005	1236
		Gunai Gaharpur	1334	1641
		Dari	1079	1327
		Bandhwa	1210	1488
		Delaunha	1228	1510
		Bishijan Khurd	1057	1300

		Lootar	1140	1402
		Jarar	1114	1370
		Akhari Shahpur	1174	1444
		Kurki Kalan	1290	1587
	Koraon	Bhagesar	2847	3502
		Koraon	5610	6900
		Semari Baghrai	2094	2576
		Kundwa	1053	1295
		Bahraicha	1323	1627
		Pawari	1567	1927
		Dei Bandh	1076	1323
		Tundihar	1087	1337
		Gorha	1567	1927
		Amila	1211	1490
		Deoghat	1726	2123
		Sansarpur	1822	2241
		Piyari	1258	1547
		Newadiyapal	1074	1321
		Sipauwa	1066	1311
		Kukurhata	1366	1680
		Khajuri Khurd	1109	1364
		Chandi	1067	1312
		Sikaro	1584	1948
		Tikar	1174	1444
		Ratyora Karpia	1385	1704
		Kasfara Kalan	1737	2137
		Taraon	1941	2387
		Baidwar Kalan	1869	2299
		Basahar	1796	2209
		Pasana	1600	1968
		Belhat	1166	1434
		Belwania	1501	1846
		Saji	1181	1453
		Koraon t. a.	5610	7832
	Manda	Barha kalan	2532	3114
		Dighiya	2566	3156
		Rajapur	2332	2868
		Manda Khas	5532	6804
		Kosara Kalan	2620	3223
		Majhigawan	2334	2871
		Garetha	1032	1269
		Badhani Hetar	1223	1504
		Banupur	1034	1272
		Becpur	1278	1572
		Mahewa Kalan	1637	2014
		Tikari	1447	1780
		Payagpur	1082	1331
		Chilbila	1240	1525

		Nahwai	1359	1672
		Khorma	1439	1770
		Chak Deeha	1055	1298
		Rajapur	1200	1476
		Handia	1567	1927
		Surwa Dalapur	1056	1299
		Tisen Tulapur	1735	2134
		Daswar	1305	1605
		Pachera	1220	1501
		Sirawal	1167	1435
		Ajodhiya	1027	1263
		Barahula Kalan	1142	1405
		Marfa Kalan	1156	1422
		Rampur Kalan	1140	1402
		Chhargara	1708	2101
		Patehri	1115	1371
		Bharatganj t. a.	9043	12465

SOURCE : District Census Hand Book, 1981.

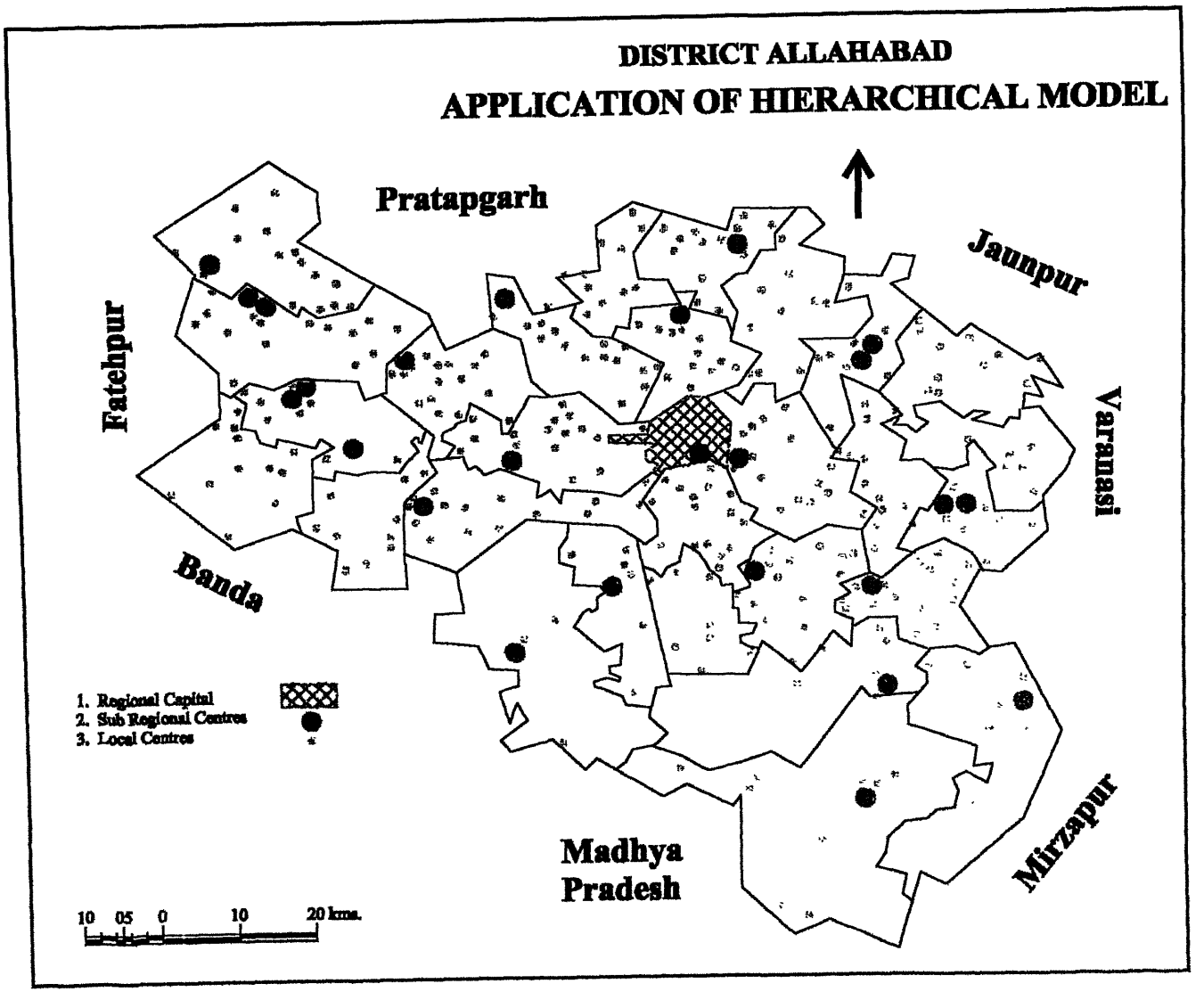
DISTRICT ALLAHABAD
APPLICATION OF HIERARCHICAL MODEL
Pratapgarh
Jaunpur
Fatehpur
Varanasi
Banda
Madhya
Pradesh
Mirzapur
1. Regional Capital
2. Sub Regional Centres
3. Local Centres
10 05 0 10 20 kms.

Fig : 5.5

Table : 5.3

PROPOSED LOCAL CENTRES, DISTRICT ALLAHABAD

Tahsil	Dev. Block	Service Centers	Population 1981	Population 1991 (App.)
Jasra	Shankargarh	Pandua	1054	1296
		Nauriha Tarhar	1269	1561
		Amilia Tarhar	1725	2122
		Othgi Tarhar	1240	1525
		Majhiari Amad	1309	1610
		Manpur	1035	1273
		Bela Mundi	1528	1879
		Chhatahara Ghuretha	1908	2347
		Basahra Tarhar	1811	2228
		Tikari Kalan	1103	1357
		Chhiri	1736	2135
		Bara Khas	1495	1839
		Laund Kalan	1026	1262
		Lohagara	1813	2230
		Bihariya	1132	1392
		Sheorajpur	1223	1504
		Nauriha	1161	1428
		Sidhtikar	1055	1298
Uruwan	Meja	Sujani Samodha	1196	1471
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		Silaudhi Kalan	1516	1865
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		Shahpur Kalan	1022	1257
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		Delaunha	1228	1510
		Bishijan Khurd	1057	1300
		Lootar	1140	1402
		Jarar	1114	1370
		Akhari Shahpur	1174	1444
		Kurki Kalan	1290	1587

	Koraon	Kundwa	1053	1295
		Bahraicha	1323	1627
		Pawari	1567	1927
		Dei Bandh	1076	1323
		Tundihar	1087	1337
		Gorha	1567	1927
		Amila	1211	1490
		Deoghat	1726	2123
		Sansarpur	1822	2241
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		Newadiyapal	1074	1321
		Sipauwa	1066	1311
		Kukurhata	1366	1680
		Khajuri Khurd	1109	1364
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		Ratyora Karpia	1385	1704
		Kasfara Kalan	1737	2137
		Taraon	1941	2387
		Baidwar Kalan	1869	2299
		Basahar	1796	2209
		Pasana	1600	1968
		Belhat	1166	1434
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		Saji	1181	1453
	Manda	Garetha	1032	1269
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		Mahewa Kalan	1637	2014
		Tikari	1447	1780
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		Chilbila	1240	1525
		Nahwai.	1359	1672
		Khorma	1439	1770
		Chak Deeha	1055	1298
		Rajapur	1200	1476
		Handia	1567	1927
		Surwa Dalapur	1056	1299
		Tisen Tulapur	1735	2134
		Daswar	1305	1605
		Pachera	1220	1501
		Sirawal	1167	1435

		Ajodhiya	1027	1263
		Barahula Kalan	1142	1405
		Marfa Kalan	1156	1422
		Rampur Kalan	1140	1402
		Chhargara	1708	2101
		Patehri	1115	1371

SOURCE : District Census Hand Book, 1981.

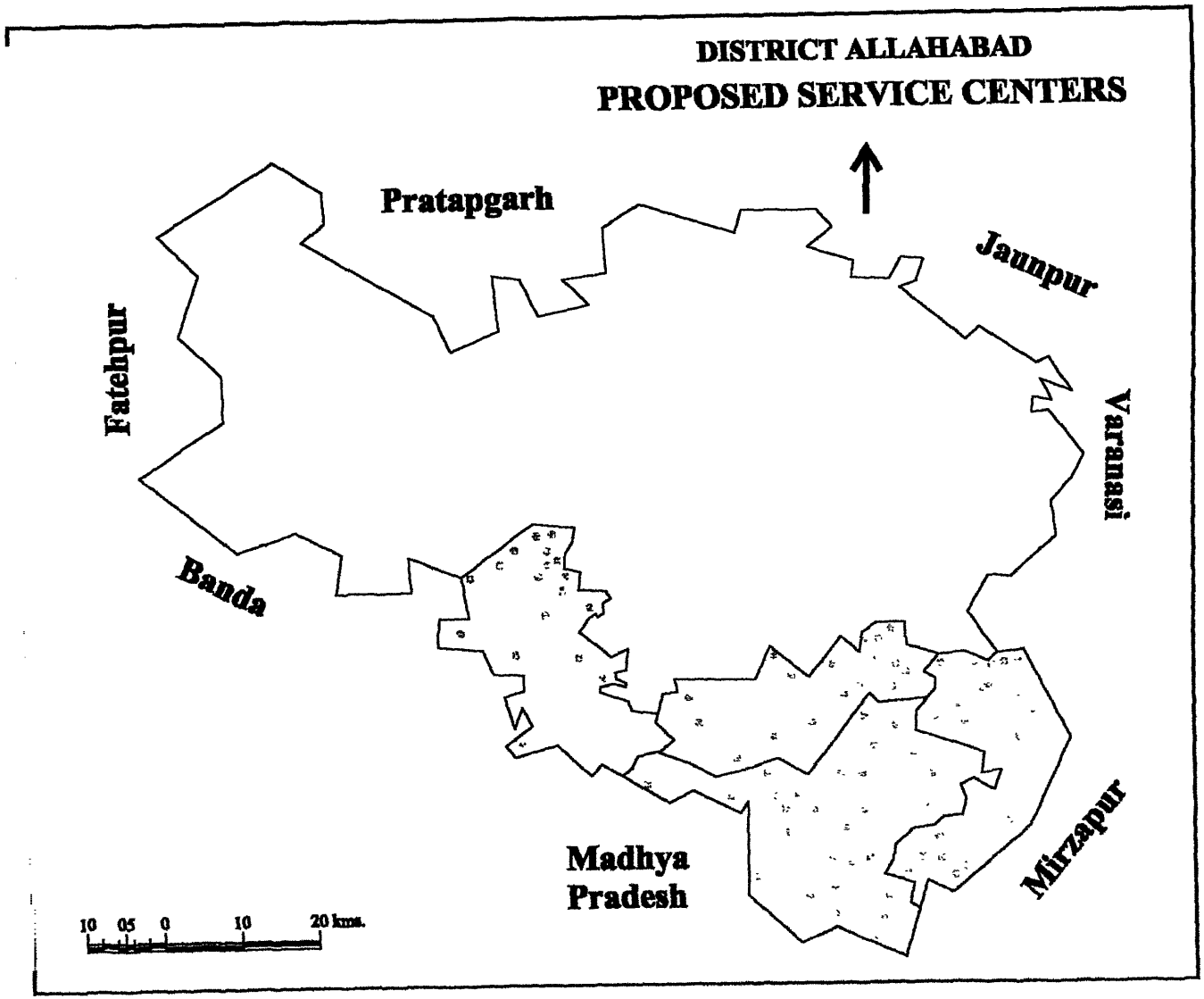
DISTRICT ALLAHABAD
PROPOSED SERVICE CENTERS
Pratapgarh
Jaunpur
Fatehpur
Varanasi
Banda
Madhya
Pradesh
Mirzapur
10 05 0 10 20 kms.

Fig : 5.6

References :

Berry, B.J.L. and Garrison, W.L., 1958 : A Note on Central Place Theory and Range of Goods, *Economic Geography*, Vol. 34, 304-311.

Chattopadhyay, S., 1995 : Wasteland Development Policies in India : A Review, *Geographical Review of India*, Vol. 57, No. 3, 286-291.

Christaller, W., 1966 : *Central Place in Southern Germany* (translated by Baskin), N.J : Prentice-Hall.

Marks, K.E., 1993 : Social Significance of Nipa Wetlands in the Tamalanrea Region, Sulawesi, Indonesia, *The Indian Geographical Journal*, Vol. 68, No. 1, 62-78.

Mayfield, R.C., 1967 : A Central Place Hierarchy in Northern India, *Quantitative Geography*, Pt. I. Economics and Cultural Topics, Illinois, 120-66.

Misra, H.N., 2000 : *Environmental Monitoring and Management of Watersheds in Himalayan Region : A case study of Sirkhad Watershed in Himachal Pradesh*, Almora : G.B. Pant Institute of Himalayan Environment and Development, 72.

Misra, H.N. and Misra, K.K., 1987 : An Evolutionary Model of Service Centers in a Slow Growing Economy in Misra, H.N. (edit), *Rural Geography*, New Delhi : Heritage Publishers.

Misra, K.K., 1981 : *System of Service Centers in Hamirpur District, U.P., India, Unpublished Ph.D. Thesis*, Bundelkhand University, Jhansi.

Perroux, F. 1955 : La Notion de Croissance, *Economique Applique*, Nos. 1 & 2.

Sundaram, K.V., 1977 : *Urban and Regional Planning in India*, New Delhi : Vikas.

Chapter 6

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

The environment and development are at the center stage of discussion at several fora because the scenario that is emerging due to increasing population, rapid industrialization and technological changes, has threatened the fine balance that exists between man and environment. Undoubtedly development is necessary to tackle the dynamics of socioeconomic problems but it is equally important to keep the environmental fabric as far as possible undisturbed. The natural resources are meant only to be used but not to be exploited. The exploitation of natural resources is basically a Western concept which emerged in 16th century with commercialization of agriculture and Industrial Revolution in Europe which gradually spread all over the world. Even Indian mind set, which have had long tradition of eco-friendly survival and development was heavily influenced by this radical view of the exploitative theory of natural resources. This attitude of man towards natural resources has threatened the balance of eco-system. As a global issue it has assumed great importance and United Nations have taken this challenge quite seriously. The concern is evident from its summit meetings in Stockholm in 1972, Nairobi in 1982 and Rio-de-Zeniro in 1992. It is in this backdrop that an effort has been made to examine the state of the art of the environment and development in middle Ganga plain by selecting the district of Allahabad as a case study.

The district of Allahabad (24°47' N to 25°47' N Lat. and 81°09' E to 82°21' E Long.) (fig. 1.8 and 1.9) which forms part of the great Ganga plain has been selected for studying the interaction between man and environment. Extending for a length of 117 kms from east to west and 101 kms from north to

south, it covers an area of 7261 sq.kms. It is bordered by the districts of Varanasi in the east, Mirzapur in the south-east, Rewa of Madhya Pradesh in the south, Banda in the south-west, Fatehpur in the west and Pratapgarh and Jaunpur in the north. The famous city of Allahabad (25°30' N to 81°55' E, MSL 103.63 M) which is of great historic antiquity is located at the confluence of three rivers - the Ganga, the Yamuna and the invisible Saraswati. The geography of the district has been mainly carved out by these river systems. It covers 2.5 percent of the total land area of the state of Uttar Pradesh and, thus, stands seventh in the State. It has a total population of about 50 lakh. The study area ranks first in terms of population among all districts of Uttar Pradesh. There are altogether 3945 villages of different sizes. Only 3539 villages are inhabited. The district is divided into 9 tahsils and 28 development blocks. [1]

There are three micro geographical units in the study area and these are the trans-Ganga tract, the Ganga-Yamuna doab and the trans-Yamuna tract. The major part of the area is almost level. The gentle and very gentle slopes cover 2.48 percent of the total area. Only 0.49 percent area is characterized by steep slope. Geologically and lithologically it presents monotonous characteristics. Hydrogeomorphologically, the study area may be divided into (i) flood plain, (ii) younger alluvial plain, (iii) older alluvial plain, (iv) inter-fluve of Ganga-Yamuna rivers, (v) alluvial plain with salt encrustation, (vi) ravinous land, (vii) moderately weathered burried pediplain, (viii) deeply weathered burried pediplain, (ix) dissected plateau and (x) back swamp.

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[1] Only recently part of the area of the district of Allahabad has gone to Kausambi, yet another newly created district. But in this study this change has not been taken into account.

The population has grown rapidly and according to 1991 census 4.92 million people lived in 3539 villages and 18 towns. In the last census i.e. 2001 the district of Allahabad recorded a total population of 5.97 million. The urban population which constitutes 20.77 percent of the total population resides in 18 urban centers. The city of Allahabad with almost one million population ranks on the top in the urban hierarchy.

The primary workers who mainly depend on cultivation and agricultural labour for sustenance range between 60-94 percent based on block level analysis. A study of landuse pattern reveals the following characteristics :

(1) The net sown area has increased. This is rightly so because the population has been increasing and, therefore, the pressure on land has also been increasing.

(2) The land devoted to horticulture has declined. This indicates that there is a greater demand for food crops and commercial crops have not gained so much popularity.

(3) The cultivable barren land has declined because it is being converted into cultivated land.

(4) The forest land appears to have marginally increased from 2.74 percent in 1973 to 3.69 percent in 1999.

(5) The landuse pattern shows that the area under cultivation is extending and is being intensively used.

The landholdings are small and the process of marginalizations of holdings is quite fast. The intensive use of land has resulted into the decreasing productivity. The landuse and irrigation intensity have reached the upper limit. The process of soil erosion, land degradation, infertility and alkalinity have

already setin. The mining activity especially the mining of building materials and silica sand has resulted into depletion of vegetative cover and thereby the soil degradation.

In order to examine the consequential impact of human intervention an effort has been done to study the spatial inequality in the study area. The variables which have been used for this purpose are as under :

(1) Road length per lakh population (1996).

(2) Junior basic school per lakh population (1996).

(3) Senior basic school per lakh population (1996).

(4) Higher secondary school per lakh population (1996).

(5) Medical facilities per lakh population (1996).

(6) Female literacy per lakh population (1991).

(7) Urban population (percent of total population, 1991).

(8) Electrified villages (percent of total inhabited villages, 1996).

(9) Villages pipe water supply (percent of total inhabited villages, 1996).

(10) Fertilizer per hectare in kilogram (1996).

(11) Gross irrigated area (percent of net irrigated area, 1996).

The composite score based on Z-score transformation of above variables reveals that the pattern of development is not uniform. There are 9 development blocks which are comparatively more developed. These are Holagarh, Soraon, Chail, Shankargarh, Jasra, Kaudhiyara, Handia, Uruwan and Manda. The less developed blocks are Majhanpur, Kaushambi, Kaurihar, Mauaima, Phulpur, Pratappur, Chaka and Meja. The under developed blocks are Kara, Sirathu, Muratganj, Sarsawan, Nevada, Baharia, Bahadurpur, Karchhana, Saidabad, Dhanupur and Koraon.

The inequality is not confined only in terms of pattern of development. The human intervention has resulted into environmental degradation as well. The forest which is the major source of ecological protection has deteriorated very fast and only 2.74 percent area is reported to be under forest. The recent claim that it has gone upto 3.69 percent could not be corroborated from the ground truthing.

The wetland and wasteland which cover nearly 12 percent of the total geographical area of the study, have great social and environmental implications. They are ecologically very sensitive areas because they tend to enrich the flora and fauna by encouraging wildlife and plant species etc. The wet lands can be developed as scenic spots and bird sanctuaries besides being the sources of irrigation and fisheries. Likewise the wastelands can be used forestry. But they are being encroached upon by human beings for cultivation and they are at the verge of being finished. The chemistry of wastelands and socioeconomic importance of wetlands is not being taken care off. Likewise frequent recurrence of flood poses serious problems by causing enormous destruction of life and property. Even though there is no accurate estimate of the area affected by flood but the areas bordering the Ganga and the Yamuna rivers are affected by floods almost every year. The flood hazard poses the severe threat to existing eco-system, socioeconomic development and ecological sustainability of the affected areas. The national policy for flood control was launched in 1954 but not much has been done in an intregated manner except some structural measures like construction of embankments and dams etc. A detailed study of environmental perception of people reveals that they have their own methods to overcome the problems caused by flood, soil-erosion, forest depletion etc. The planning at the watershed

level can be a good solution in this context. The governments do not co-ordinate with the people in so far as the problem solving process is concerned. There is complete dearth of participatory role of people. People do not participate in the development.

The contemporary direction of development has several ramifications pertaining to environment and ecology both in rural as well as urban areas. The model known as integrated mission for sustainable development (IMSD) adapted by NRSA, Hyderabad has been used for sustainable development planning of the area under study. The model is self explanatory, comprehensive and analytical which can be replicated in different locales and at different scales. The basic idea of this model is to maintain the balance between productivity and ecological set-up. The greatest advantage of this model is that it helps to prepare the data-base which may be helpful in addressing the developmental issues.

In the present analysis two fold planning has been suggested for sustainable development. These are spatio-functional planning and eco-planning. The basic idea behind spatio-functional planning is that the spatial and functional organization is essential for integrated development. This helps in three ways. It enhances the horizontal linkages and thereby the movement of trade and traffic which is essential for economic development. It helps in the development of basic infrastructural facilities such as roads and railways and policy and non policy functions such as social, economic, cultural and political facilities and institutions. This improves the accessibility to the market and thus helps in improving the per capita income. Based on these assumptions a hierarchical model of settlements has been proposed. According to this model there may be four orders of the

settlements systems. The city of Allahabad at the apex with all the high, medium and low level facilities will represent the first order or work as a regional capital.

The urban centers and tahsil headquarters with medium and low level facilities may work as sub-regional centers. These will provide the link to the rural service centers or local centers which will have represent the third order. The rural service centers will strong linkages with the villages as well as with the sub regional centers. The rural service centers are supposed to have lower level services which satisfy the day today needs of the villagers. This hierarchical network of settlements needs to be strengthened in order to produce the optimum result.

The eco development planning which has been suggested in the previous chapter, aims at environmental protection by way of use of land, water, mineral and other natural resources such as wasteland and wetland etc. according to their carrying capacity. The forest cover which is only 2.74 percent needs to be strengthened by social and agro-forestry. The waste land and wetlands which represent complex eco systems need to be developed from educational, aesthetic and economic view points.

The geographic research has great policy implications and few geographers who have made significant contribution in the area of policy research are Berry (1973), Chisholm et al. (1973), Harvey (1974), Sundaram (1977), King et al. (1978), and Bennett (1981). The geographers provide desired feedback as policy input for implementation of the sustainable development planning. Some of the important steps which are necessary for maintaining the balance between environment and development in the area of study are as under (see fig. 6.1).

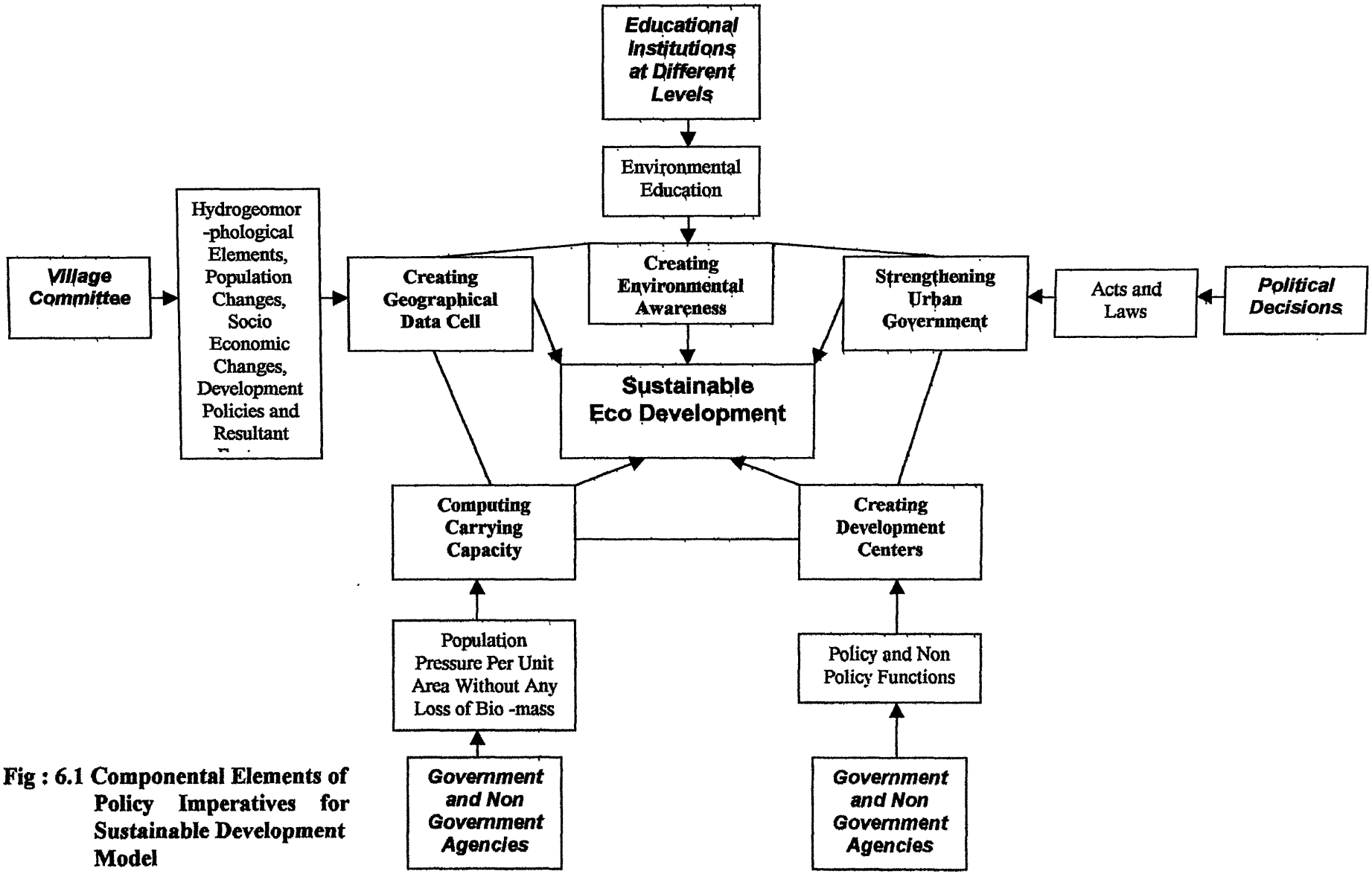

Fig : 6.1 Componental Elements of Policy Imperatives for Sustainable Development Model

1. Creating the geographical data cell :

It is seriously felt that the data pertaining to environment and development is not being maintained. In fact there is no agency as such to monitor the changes that take place in natural resource status and developmental level. There is nexus between environment and development. This ecological nexus needs to be continuously monitored which can be done by creating a network of data system at the village, block, tahsil and district headquarters. This data should be maintained even at the level of the rural service centers and urban centers. The data base should pertain to hydrogeomorphological elements, population changes, socioeconomic changes development policies and resultant features. The recent amendment of the constitution to decentralization of the power at the village level is a welcome feature. There is need to establish the Village Development Committees within the frame of this amendment. The Village Development Committee may be entrusted with the task of collecting and maintaining the data besides monitoring the changes and suggesting the management for rural sustainable development.

2. Computing the carrying capacity :

This is crucial and most important concept which needs to be rationalized in order to understand the threshold level of different natural resources in different geographical settings. Carrying capacity basically helps in determining population pressure per unit area. There is, thus, need to calculate the limiting capacity or the level of resistance of the natural environment (Ramade, 1984). Land forms the basic resources base and the carrying capacity of different types of lands found in different hydrogeomorphological units is essential in order to suggest the harmony between nature and man. Even though the current state of

development is such that the technological manipulative capacity of people is limited, but eventually it can pose a serious problem.

3. Creating Development Centers :

This is true that the settlements are the product of regional economy but this is also possibly true that the regional economy can be made stronger by developing some growth points and growth centers based on the line suggested by Perroux (see Misra et al., 1974 and Misra, 1984). Based on the hierarchic model suggested in chapter 5 the rural service centers may be taken up to promote them as growth points by providing some policy level function such as schools, colleges polytechnics, banking and commercial services, small scale agro-based industries, child and maternity welfare centers, veterinary services and dispensaries. These services will automatically attract some other non-policy functions due to centripetal forces. These growth points will, thus, become the immediate attraction for rural people as they will open the scope for earning the livelihood to the rural people. Likewise the urban centers, and tahsil headquarters may be selected to develop as growth centers. These growth centers may be provided the services such as degree colleges, technical institutions, industrial training centers, agriculture training centers, the training centers promoting horticulture, pisciculture, sericulture, recreational centers, hospitals besides the services already available in the growth points. This could help in strengthening the infrastructure facilities in rural areas and also arresting the exodus of rural people to urban areas.

The small and intermediate town development strategy established in the recent past was an effort in right direction but the move has was scuttled because

the state government could not provide the matching grant. The state government should take up this on priority basis.

4. Strengthening the Urban government :

The urbanization is considered as one of the measures of development. The state of urbanization as at present is very poor because only 20.77 percent people of the study area are living in urban centers. Allahabad is the only city of any consequence. All the remaining urban centers are rurban in nature. The city of Allahabad has touched the million mark in terms of population. It has been experiencing the continuous inflow of rural people. The rate of reproduction is also quite high. The city is not able to manage the increasing pressure of population. The increasing population of pigs, cattles, stray dogs and some animals has made the situation worst. The city is experiencing all kinds of pollution. The drains are choked. The lanes, bilanes and roads are huddled with traffic. The garbage (both biodegradable and non-biodegradable) can be seen anywhere and everywhere. The situation of smaller towns is still worst. The process of invasion and penetration of rural functions into the urban centers of the study area is very common. This has been referred to as ruralization of cities (Misra & Misra, 1983). This is because the urban government is very weak. There are no clear-cut urban development policies. The small towns lack even the basic administrative infrastructure. There is dearth of staff, instruments and equipments to deal with the problem of garbage removal which is the major source of pollution. There is a need to formulate the clear-cut urban development policies pertaining to control of migration of population, removal of encroachment, and enhancement of infrastructural facilities and public utilities. The urban landuse

pattern needs to be properly planned which has not been done so far inspite of the rapid growth of urbanization.

The urban government is not only weak, it lacks expertise, adequate staff, sufficient fund and political backing for implementing the existing policies for better urban future. The urban governments need to be armed with power and policies to implement them. As far as possible the ways and means should be devised to make them self-sustaining.

5. Creating environmental awareness :

We have had a long tradition of environmental ethics and awareness. The Indian philosophy views man as part of nature. It is, however, unfortunate that under the western influence we have ignored the maxim of Vedas, Puranas and other ancient scriptures which preach the philosophy of coexistence of man with nature. There is an urgent need to reinculcate the environmental ethics and environmental education. In fact there is a need for environmental awareness programme to be launched to educate at the household level, primary school level, college level and even at the university level. The environment green movement may be started by the governmental agencies but the non governmental organization may play the crucial and critical role in promoting the environmental awareness among the masses.

The study area witnesses very low level of female literacy (13.9 percent) mainly because of the inaccessibility of educational facilities to the rural female population. The creation of educational facility in the growth points and growth centers may enhance the accessibility and promote the female education. There is a serious view that the education among the female is very important to promote environmental ethics and education among the masses.

These are only some of the suggestions for the sustainable development planning. If these are taken care off, all others will eventually follow.

References :

Bannett, R.J., 1981 : *Quantitative Geography and Public Policy*, London : Routledge & Kegan Paul.

Berry, B.J.L., 1973 : *The Human Consequences of Urbanization*, London : Macmillan.

Chisholm, M. and Manners, G. (eds), 1973 : *Spatial Policy Problems of the British Economy*, London : Cambridge University Press.

Harvey, D., 1974 : What kind of Geography for what kind of Public Policy ?, *Transactions, The Institute of British Geographers*, Vol. 63, 18-24.

King, L.J. and Clark, G.L., 1978 : Government Policy and Regional Development, *Progress in Human Geography*, Vol. 2, 1-16.

Misra, H.N., 1984 : *Urban System of a Developing Economy Allahabad* : IIDR and also in 1988, New Delhi : Heritage Publishers.

Misra, R.P. and Misra, H.N., 1983 : Ruralization of Indian cities, *Urban India*, Vol. 3, 3-12.

Misra, R.P. et al., 1974 : *Regional Development Planning in India : A New Strategy*, New Delhi : Vikas.

Ramadey, F., 1984 : *Ecology of Natural Resources*, New York : John Wiley & Sons, 17.

Sundaram, K.V., 1977 : *Urban and Regional Planning in India*, New Delhi : Vikas.

Bibliography

Alash, C. and Bowers, J., 1988 : Alternative Approaches to Valuation of Environmental Resources in Turner, R.K. (ed.), *Sustainable Environmental Management*, Bellhaven : Bellhaven Press.

Allen, J.C. and Barnes, D.F., 1985 : The Cause of Deforestation in Developing Countries, *Annals of The Association of American Geographers*, Vol. 75, 163-84.

Angell, D.J.R., Comer, J.D. & Wilkinson, M.L.N. (eds), 1990 : *Sustaining Earth*, London : Macmillan.

Ashby, E., 1978 : *Reconciling Man with the Environment*, London : Oxford University Press.

Backerman, W., 1992 : Economic Growth and the Environment; Whose Environment? *World Development*, Vol. 20, No. 4, 481-496.

Balaji, K., Raghavswamy, V., Ram Mohan, P., Nagaraja, R. & Gautam, N.C., 1995 : Remote Sensing Analysis of Landuse / Landcover of Proposed Tuticorin Refinery Site : An Input for Environmental Impact Assessment, *Annals, The National Association of Geographers India*, Vol. 15, No.2, 121-125.

Banerjee, Bireswar, 1997 : Population Explosion, Food Security and Sustainable Development, *Geographical Review of India*, Vol. 59, No.1, 1-10.

Bano, H., Saxena, M.R., Nagaraja, R. & Gautam, N.C., 1995 : Horticulture Land Use Analysis of Pulwama District, Jammu & Kashmir, Using Satellite Remote Sensing Technique, *Annals, The National Association of Geographers India*, Vol. 15, No. 2, 110-120.

Barrett, E.C. and Curtis, L.F., 1976 : *Introduction to the Remote Sensing of the Environment*, London : Chapman and Hall.

Barrett, E.C. and L.F. Curtis, 1982 : *Introduction of Environmental Remote Sensing*, New York : Halsted Press.

Bartels, D., 1982 : Geography : Paradigmatic Change of Functional Recovery? A View from West Germany in Gould, P. and Olsson, G., (eds), *A Search for Common Ground*, London : Pion.

Beaumont, P., 1978 : Man's Impact on River System : A World-Wide View, *Area*, Vol. 10, 38-41.

Beaumont, P., 1989 : *Environmental Management and Development in Drylands*, London : Routledge.

Berry, B.J.L., 1974 : *Landuse, Urban Form and Environmental Quality*, University of Chicago : Department Of Geography Research Series.

Bidwell, R., 1992 : Sustainability : The Link Between Conservation and Economic Beneits, *Economic Impact Assessment Review*, Vol. 12, No. 1 & 2, 37-48.

Binda, P.R., 1988 : Exploratory Analysis of the Water Resources of Semi-Arid Regions of Rajasthan, In Mathur, H.S. (ed), *Environment & Resources – The Diversity of Development*, Jaipur : Raj. Books, 103-115.

Bose, Ashish, 1988 : *From Population to People*, in 2 Vol., New Delhi : B.R. Publishing Corporation.

Bose, Ashish, 1991 : *Demographic Diversity of India: 1991* Census State and District Level Date, New Delhi : B. R. Publishing Corporation.

Butzer, K.W., 1974 : Accelerated Soil Erosion: A Problem of Man-Land Relationships, In Manners, I.R. and Mikesell, M.W. (eds), *Perspectives on Environment*. Washington DC : Association of American Geographers.

Carew-Reid, J., Prescott–Allen, R., Bass, S. & Dalal–Clayton, B., 1994: *Strategies for National Sustainable Development : A Handbook for their Implementation*, London : Earthscan.

Carter, R.W.G., 1988 : *Coastal Environments*, London : Academic Press.

Charles, E and Olson, J.R., 1967 : Accuracy of Landuse Interpretation from Infrared Imagery in the 4.5 To 5.5 Micro Band, *Annals of The Association of American Geographer*, Vol. 57, No. 2, 382-388.

Chattopadhyay, S. and Carpenter, R.A., 1991 : Sustainable Development : Scientific Jargon or A Practical Management Alternative ?, *Annals, The National Association of Geographers India*, Vol. 11, No.2, 1-12.

Chattopadhyay, S., 1995 : Wasteland Development Policies in India : A Review, *Geographical Review of India*, Vol. 57, No. 3, 286-291.

Chute, R. M. (ed.), 1971 : *Environmental Insight*, New York : Mac Million.

Clark, J.R., 1977 : *Coastal Ecosystem Management*, New York : Wiley.

Clark, W.C. and Munn, R.E. (eds), 1986 : *Sustainable Development of the Biosphere*, Cambridge : Cambridge University Press.

Coates, B.E., Johnston, R.J. & Knox, P.L., 1977 : *Geography and Inequality*, Oxford : Oxford University Press.

Cole, M.M. and Smith, R.F., 1984 : Vegetation as an Indicator of Environmental Pollution, *Transactions, The Institute of British Geographer*, Vol. 9, 477-93.

Conacher, A.J., 1979 : Water Quality and Forest in Southern Australia : Review and Evaluation, *Australian Geographer*, Vol. 14, 150-9.

Dasmann, R., 1959 : *Environmental Conservation*, New York : J. Wiley and Sons.

Dawson, J.A. and Doornkamp, J.C. (ed), 1973 : *Evaluating the Human Environment - Essays in Applied Geography*, London : Edward Arnold Ltd.

Dayal, P., 1995 : "An Agenda for Indian Geography" (Presidential Address), *Annals, The National Association of Geographers India*, Vol. 15, No. 1, 1-15.

Detwyler, T.R. (ed), 1971 : *Man's Impact on Environment*, New York : Mc Graw-Hill.

Douglas, I., 1983 : *The Urban Environment*, London : Arnold.

Dovers, S.R. and J.W. Handmer, 1992 : Uncertainty, Sustainability and Change. *Global Environmental Change*, Vol. 2, No. 1, 262-276.

Dubey, R. N., 1992 : *Population, Environmental and Regional Planning*, Allahabad : Chugh Publications.

Dunne, T. and Leopold, L.B., 1978 :, *Water in Environmental Planning*, San Francisco : Freeman.

Dwivedi, R.L., 1959 : *Allahabad-A Study in Urban Geography*, Unpublished D. Phil. Thesis, Allahabad University.

Dwivedi, R.L., 1961 : Allahabad : A Study in Industrial Development, *Nat. Geogr.*, Vol. 4, 53-60.

Dwivedi, R.L., 1965 : Demographic Features of Allahabad City, *Geog. Rev. Ind.*, Vol. 27, 163-188.

Eden, M.J., 1990 : *Ecology and Land Management in Amazonia*, London and New York : Bellhaven Press.

Ekins, P., 1991 : A Strategy for Global Environmental Development, *Development*, No. 2, 64-73.

Elliott, J.A., 1994 : *Introduction to Sustainable Development*, London : Routledge.

Elson, D., 1989 : *Atmospheric Pollution*. Oxford and Cambridge : Mass, Basil Blackwell.

Fenneth, E.F.W., 1982 : *Understanding the Environment*, Boston : Allyn and Bacon Inc.

Forest Survey of India, 1991 : *The State of Forest Report*, F.R.I., Dehradun.

Ghatol, S. and Khare, Y.D., 1995 : Village Level Spatial Data Base for Resources Development Using Satellite Data-A Need of the Hour, *Annals, The National Association of Geographers India*, Vol. 15, No. 2, 70-77.

Gosal, G.S., 1979 : Spatial Perspective on Literacy in India, *Population Geography*, Vol. 1, Nos. 1 & 2, 41-67.

Government of India, 1987 : *Priorities for Environment Research (A Matrix Approach)*, New Delhi : Ministry of Environment and Forest.

Graf, W., 1992 : Sustainable Ideologies and Interests : Beyond Brundtland, *Third World Quarterly*, Vol. 12, No. 3, 553-559.

Gregory, K.J. and Walling, D.E (eds), 1986 : *Man and Environmental Processes*, Chichester : Wiley.

Haggett, P., 1979 : *Geography: A Modern Syntheses*, London : Prentice Hall.

Harvey, M.E. and Holly, B.P., 1989 : *Themes in Geographic Thought*, Jaipur : Rawat.

Hazra, Jayati, 1997 : Women and Literacy, *Geographical Review of India*, Vol. 59, No. 1, 62-74.

Holling, C.S. (ed.), 1978 : *Adaptive Environmental Assessment and Management*, Chicester : John Wiley.

Holmberg, J., Bass, S. & Timberlake, L., 1991 : *Defending the Future : A Guide to Sustainable Development.* London : Earthscan.

Howe, G.M., Slaymaker, H.O. & Harding, D.M., 1967 : Some Aspects of the Flood Hydrology of the Upper Catchments of the Severn and Wye, *Transactions, The Institute of British Geographers,* Vol. 41, 33-58.

Hudson, N., 1971 : *Soil Conservation,* London : Batsford.

Jacks, G. V. and Whyte, R.O., 1939 : *The Rape of the Earth; A World Survey of Soil Erosion,* London : Faber & Faber.

Jones, D.K.C., 1983 : Human Occupance and the Physical Environment, In Johnston, R.J. and Doornkamp, J.C., (eds), *The Changing Geography of the United Kingdom,* London : Methuen.

Joshi, E.B., 1968 : *Allahabad District Gazetteer,* Allahabad : Government Press.

Kant Syrya, 1995 : Development and Environment in an Indian Mountain State, *Geographical Review of India,* Vol. 57, No. 2, 97-112.

Kedekudi, G., 1992 : The Paradigms of Sustainable Development, *Development,* No. 3, 72-76.

Mabogunje Akin, L., 1981 : *The Development Process - A Spatial Perspective,* London : Hutchinson.

Marks, K.E., 1993 : Social Significance of Nipa Wetlands in the Tamalanrea Region, Sulawesi, Indonesia, *The Indian Geographical Journal,* Vol. 68, No. 1, 62-78.

Meyer, W.B. and Turner, B.L., Ii (eds), 1994 : *Changes in Landuse and Land Cover : A Global Perspective,* Cambridge : Cambridge University Press.

Misha H.N., 1983 : Rural Urban Relations in Sudan-A Case Study of Gezira Scheme, *Ekistics,* Vol. 300, 163-170.

Misra, B.N., 1990 : *Land Utilization and Management in India*, Allahabad, Chugh Publication.

Misra, H.N. and Singh, V.P., 1998 : *Research Methodology-Social Spatial and Policy Dimensions*, Jaipur and New Delhi : Rawat Publications.

Misra, H.N., 1975 : The Size and Spacing of Towns in the Umland of Allahabad, *The Geographer*, Vol. 22, 45-55.

Misra, H.N., 1976 : Hierarchy of Town in the Umland of Allahabad, *The Deccan Geographer*, Vol. 14. 34-47.

Misra, H.N., 1977 : Empirical and Theoretical Umlands of Allahabad, *Geographical Review of India*, Vol. 39, 312-319

Misra, H.N., 1978 : *Urban Amenities in Allahabad City Region, India, Allahabad*, IIRD, Occasional Publication Series, No. 1, 1-9.

Misra, H.N., 1984 : Human Settlement System and Policy Implications for Regional Development in Developing Economy, in Kammeir, H. D. et al. (Edt), *Planning Perspectives for Small Towns in Developing Countries*, Bangkok : AIT.

Misra, H.N., 1986 : *Popular Settlements in Indian Cities; A Case Study of Allahabad*, Project Report Sponsored by the IIED, London, Financed by the Canadian International Development Agency, Dutch Government and U. N. Centre for Human Settlements (HABITAT).

Misra, H.N., 1988 : Popular Settlements in the City of Allahabad, *Cities, the International Journal of Urban Policy*, U.K., Vol. 5, No. 2, 163-183.

Misra, H.N., 1988 : *Urban System of a Developing Economy*, New Delhi : Heritage Publishers.

Misra, H.N., 1989 : Traditional and Contemporary Paradigms of Geography, *Annals, The National Association of Geographers India*, Vol. 9, No. 1, 49-58.

Misra, H.N., 1990 : *Housing and Health in three Squatter Settlements in Allahabad, India* (Chapter Four), in Hardcy, J.E.et al. (ed), Housing and Health in Third World Cities, London : Earthscan.

Misra, H.N., 1991 : Pattern of Growth in India's Class I Cities, *Geoforum*, Vol. 22, No.3, 271-286.

Misra, I., 1991 : *Human Settlement System and Regional Development in Allahabad District; the Problems and Policies*, Unpublished D.Phil. Thesis, University of Allahabad.

Misra, R.P. and Misra, H.N., 1983 : Ruralisation of Indian Cities : A Study of the Process of Penetration of Rural Functions in Urban Areas of Slow-growing Economies, *Urban India*, Vol. 3, No. 3, 3-12 and also in K.V. Sundaram, (ed), *Geography and Planning*, New Delhi, Concept.

Misra, R.P. and Misra, H.N., 1986 : Human Survival and Development : Focus on Land, Water and Minerals, *Annals, National Association of Geographers*, India, Vol. 6, No. 2, 21-38.

Misra, R.P. et. al., 1980 : *Multi–Level Planning and Integrated Rural Development in India*, New Delhi : Heritage Publishers.

Misra, R.P., 1974 : *Regional Development Planning in India, A New Strategy*, New Delhi : Concept.

Mitchell, B., 1993 : Sustainable Development, Uncertainty and the Precautionary Principle, *The Indian Geographical Journal*, Vol. 68, No. 1, 1-5.

Mitra Bhaskar, 1995 : Use of Geographic Information System (GIS) & Remote Sensing in Interpreting Land use, *Geographical Review of India*, Vol. 57, No. 2 150-155.

Morse, S. and Stocking, M. (eds), 1995 : *People and Environment*, London : U C L Press.

Nagaraja, R., Ram Mohan, P., Gautam, N.C., Padmapriya, K.V.N. & Jyothi, R., 1995 : Remote Sensing and GIS for Environmental Analysis, *Annals, The National Association of Geographers India*, Vol. 15, No. 2, 95–109.

Nanjundappa, D.M., 1980 : *Area Planning and Rural Development*, New Delhi : Associated Publishing House.

Nasrollh, Bassrani and Gill, G.S., 1999 : Environmental Aspect of Wetland Ecosystem of Seistan Basin, SE Iran, *Transactions Institute of Indian Geographers*, Vol. 21, No. 2, 59-63.

National *Mission on Wasteland Development*, 1990 : The Integrated Wasteland Development Plan for the Project Area, Purulia.

Odum, E.P., 1959 : *Fundamentals of Ecology*, Tokyo, Toppan Company Ltd,.

Panchadhyayi, S. and Biswas, A,.1985 : Basin Environment and Management–The Case of the Subarnarekha System, *Trans. Inst. Indian Geographers*, Vol. 7, No. 2, 131-145.

Pangtey, Y.P.S. and Joshi. S.C., 1987 : *Western Himalaya : Problems and Development*, Nainital : Gyanodaya Prakashan.

Parikh, K.S., 1996 : Equitable Sustainable Development of Gujarat. *Economic and Political Weekly*, Vol. 31, No. 19,1151-1164.

Pearce, D., 1988 : The Sustainable Use of Natural Resources in Developing Countries in Turner, R.K. (ed.), *Sustainable Environmental Management*, Bellhaven : Bellhaven Press.

Prudhvi Raju, K.N., Khan, A.R. & Singh, S., 1989 : Geographic Information Systems to Evaluate Land for Environmental Management : A Case Study from Eastern Madhya Pradesh, *Annals, The National Association of Geographers India*, Vol. 9, No .1, 19-27.

Remedios, G. and Sita, K., 1999 : The Environs of Tarapur Atomic Power Station : The Role of Grass in the Landuse Pattern, *Transactions Institute of Indian Geographers*, Vol. 21, No. 2, 7-22.

Sambasiva Rao, M. and Nageswari, K., 1983 : Evaluation of Land and Water Resources of Cumbum Valley in Madurai District, Tamil Nadu, *Trans. Inst. Indian Geographers*, Vol. 5, No. 1, 77-89.

Sehgal, J. and Abrol, I.P., 1994 : *Soil Degradation in India : Status and Impact*, New Delhi : Oxford and IBH Publishing Co.

Simmons, I. G., 1981 : *The Ecology of Natural Resources*, London : Edward Arnold.

Simmons, I., 1989 : *Changing the Earth : Culture, Environment and History*, Oxford : Basil Blackwell.

Simon, J.L. and Kahn, H., 1984 : *The Resourceful Earth-A Response to Global 2000.* Oxford : Basil Blackwell.

Singh, J., Shrinet, A.S. & Kumara, V.K., 1992 : Urban Environmental Crisis : A Study of Bhopal Gas Tragedy, *Trans. Inst. Indian Geographers*, Vol. 14, No. 2, 113-125.

Singh, L.R. et al (Ed.), 1983 : *Environmental Management, Allahabad*, Allahabad, Geographical Society.

Singh, R., 1999 : Flood Hazard in Rohtak City : A Geographical Perspective, *Transactions Institute of Indian Geographers*, Vol. 21, No. 2, 65-83.

Sinha, U., 1983 : *Service Centres and their Role in the Diffusion of Agricultural Innovations in Karchhana Tahsil of Allahabad District*, Unpublished D. Phil Thesis, University Of Allahabad.

Sircar, P. K., 1997 : Sustainable Development in India, *Geographical Review of India*, Vol. 59, No. 1, 75-81.

Sircar, P.K., 1996 : *Environmental Laws and Laws of the Environment*, Vol. 58, No. 3, 177-186.

Spencer, T. And Douglas, I. 1985 : The Significance of Environmental Change : Diversity, Disturbance and Tropical Ecosystems, In I. Douglas and I. Spencer (eds), *Environmental Change and Tropical Geomorphology*, London : Allen & Unwin.

Srinivasulu, S., Kesava, K. and Sudheer, A. S., 1995 : Micro Level Regional Analysis of Land Carrying Capacity-A Case Study, *Geographical Review of India*, Vol. 57, No. 2, 138-149.

Sundaram K.V., 1992 : District Planning for Sustainable Development, *Annals, The National Association of Geographers India*, Vol. 12, Nos. 1&2, 91-102.

Sundaram, K.V., 1979 : *Urban and Regional Planning in India, New Delhi :* Vikas.

Talba, M.K., 1982 : *Development Without Destruction*, Dublin : Tycooly Interactional Publishing Ltd.

Taylor, P.J., 1985 : The Value of a Geographical Perspective, in R.J. Johnston (ed), *The Future of Geography*, London : Methuen.

U. N. Food and Agriculture Organization (F A O), 1984 : *Potential Population Supporting Capacities of Land in the Developing Countries*, Rome, F A O.

United Nations Conference on Environment and Development, 1992 : *The Rio Declaration on Environment and Development*, Geneva, Switzerland : UNCED Secretariat.

United Nations, 1971 : *Development and Environment* (Founex Report), Paris : Mouton Published with Comments in International Conciliation, No. 586.

Walters, C.J., 1986 : *Adaptive Management of Renewable Resources*, New York : Macmillan.

Warren, A. and Maizels, J.K., 1976 : *Ecological Change and Desertification*, London : University College.

Watt, K.E.F., 1968 : *Ecology and Resources Management : A Qualitative Approach*, New York : Mc Graw Hill.

Whitaker, J.R., 1940 : World View of Destruction and Conservation of Natural Resources. *Annals of The Association of American Geographers*, Vol. 30, 143-62.

Wood, D.M., 1994 : Sustainable Development in the Third World : Paradox or Panacea?, *The Indian Geographical Journal*, Vol. 68, No. 1, 6-20.

World Bank, 1992 : *Development and the Environment*, Oxford : Oxford University Press.

World Commission on Environment and Development, 1987 : *Our Common Future*, Oxford and New York : Oxford University Press.

World Development Report, 1992 : *Development and the Environment*, Delhi,

Oxford University Press.

World Resource Institute, 1986 : *World Resources*, New York : Basic Book Inc.

Wynne, B., 1992 : Uncertainty and Environmental Learning : Reconceiving Science and Policy in the Preventive Paradigm, *Global Environmental Change*. Vol. 2, No. 2, 111-127.

Appendices

Appendix : 1

POPULATION GROWTH IN RURAL AREAS [IN PERCENT]
DISTRICT ALLAHABAD, 1971-1991

Dev. Block	1971	1981	1991
Kara	11.5	16.5	27.3
Sirathu	14.0	16.9	45.3
Sarsawan	22.2	25.3	21.1
Manjhanpur	5.7	7.8	27.0
Kaushambi	20.2	25.0	24.3
Muratganj	17.6	25.0	17.1
Chail	7.6	20.9	33.5
Nevada	10.5	18.8	24.3
Kaurihar	10.6	13.3	28.1
Holagarh	27.6	29.9	26.4
Mauaima	29.0	30.2	30.0
Soraon	28.4	31.4	26.5
Baharia	19.2	26.5	31.8
Phulpur	21.9	29.9	35.0
Bahadurpur	21.0	26.1	29.5
Pratappur	27.2	29.0	30.8
Saidabad	25.5	30.1	29.6
Dhanupur	30.1	36.5	32.7
Handia	22.2	27.5	35.9
Jasra	20.7	31.7	15.5
Shankargarh	20.5	24.5	28.1
Chaka	11.5	25.6	43.3
Karchhana	21.1	26.1	29.1
Kaudhiyara		39.6	36.4
Uruwan	29.5	30.2	27.8
Meja	31.1	34.5	36.0
Koraon	30.1	36.5	38.2
Manda	30.2	33.5	17.7
Total	20.0	26.2	29.0

SOURCE : District Statistical Bulletin, 1977, 1987, 1997.

Appendix : 2

POPULATION GROWTH IN RURAL AREAS [IN PERCENT]
DISTRICT ALLAHABAD, 1971-1991

Dev. Block	1971-1991	Average Growth 1971-1991
Kara	86.1	4.3
Sirathu	48.7	2.4
Sarsawan	52.4	2.6
Manjhanpur	36.9	1.8
Kaushambi	55.8	2.8
Muratganj	34.5	1.7
Chail	61.5	3.1
Nevada	17.1	0.9
Kaurihar	46.2	2.3
Holagarh	64.3	3.2
Mauaima	69.2	3.5
Soraon	40.8	2.0
Baharia	66.7	3.3
Phulpur	75.4	3.8
Bahadurpur	63.1	3.2
Pratappur	68.6	3.4
Saidabad	68.6	3.4
Dhanupur	81.1	4.1
Handia	73.2	3.7
Jasra	52.2	2.6
Shankargarh	59.4	3.0
Chaka	80.0	4.0
Karchhana	62.8	3.1
Kaudhiyara	90.3	4.5
Uruwan	66.3	3.3
Meja	82.9	4.1
Koraon	88.6	4.4
Manda	57.2	2.9
Total	62.8	3.1

SOURCE : District Statistical Bulletin, 1987, 1997.

Appendix : 3

PERCENTAGE OF RURAL AND URBAN POPULATION DISTRICT ALLAHABAD, 1901-1991

Census Year	Rural Population	Urban Population
1901	85.4	14.6
1911	86.3	13.6
1921	86.7	13.3
1931	85.6	14.4
1941	82.1	17.9
1951	82.1	17.9
1961	81.8	18.2
1971	81.5	18.5
1981	79.6	20.4
1991	79.2	20.8

SOURCE : District Census, Allahabad, 1901-1981.
District Statistical Bulletin, 1997.

Appendix : 4

SEX RATIO IN URBAN AREAS [NO. OF FEMALE / 1000 MALE]
DISTRICT ALLAHABAD, 1981-1991

Town / City	1981	1991
Ajhuwa T. A.	888	902
Sirathu T. A.	811	883
Karari T. A.	1010	940
Manjhanpur T. A.	884	856
Bharwari T. A.	806	849
Sarai Aqil T. A.	879	861
Chail T. A.	849	890
Allahabad U. A.	811	813
Nindura T. A.	908	910
Mauaima T. A.	926	897
Phulpur T. A.	861	859
Jhusi T. A.	844	674
Handia T. A.	825	830
Shankargarh T. A.	883	827
Bharatganj T. A.	890	923
Sirsa T. A.	897	837
Koraon T. A.		821
Total	822	821

SOURCE : District Statistical Bulletin, 1987, 1997.

Appendix : 5

DISTRIBUTION & GROWTH OF POPULATION IN URBAN AREAS, DISTRICT ALLAHABAD, 1901-1991

Growth Rate in Percent [In Bracket]

Town / City	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991
Ajhuwa T. A.							2796		8470	11803 [39.4]
Sirathu T. A.							3628	4621 [27.4]	6149 [33.0]	9088 [47.8]
Karari T. A.							4620		7121	9151 [28.4]
Manjhanpur T. A.	3221								6567	8687 [32.3]
Bharwari T. A.						3365	3892		9571	11085 [15.8]
Sarai Aqil T. A.	2730		2540	3942 [55.2]	4685 [54.4]	4542 [-3.6]	4987 [9.8]		9435	11821 [25.3]
Chail T. A.							3255		4664	6123 [31.3]
Allahabad U. A.	17203 [2.0]	171697 [-19.0]	157200 [-8.4]	183914 [16.9]	260630 [41.7]	332295 [27.5]	430730 [29.6]	513997 [19.3]	646493 [25.7]	844546 [30.7]
Nindura T. A.							3878		13114	19296 [47.1]

Mauaima T. A.	6769	6412	5400	5078	5722	5508	6400	7939	10053	13167
		[-5.3]	[-15.8]	[-5.9]	[12.7]	[-3.7]	[16.2]	[24.0]	[26.6]	[31.0]
Phulpur T. A.	7611	7505	5329	4885	5677	5728	6850	8549	11793	16767
		[-1.4]	[-2.9]	[-8.3]	[16.2]	[0.89]	[19.6]	[24.8]	[37.9]	[42.4]
Jhusi T. A.	3352	3379	1907	1623	2962	2970	3041		4567	7943
		[0.8]	[-43.5]	[-14.9]	[-9.8]	[-9.8]	[12.2]			[73.9]
Handia T. A.							2500		8939	13000
										[48.8]
Shankargarh T. A.							2907		6882	10662
										[54.9]
Bharatganj T. A.	3105	3108	3031	3278	4306	4904	4837	6447	9043	12465
		[0.1]	[-2.5]	[8.1]	[31.4]	[13.9]	[-1.4]	[33.3]	[40.3]	[37.8]
Sirsa T. A.	4159	3430	2973	3143	3742	4134	4866	6110	7343	8929
		[-17.5]	[-13.3]	[5.7]	[19.1]	[10.4]	[17.7]	[25.6]	[20.2]	[21.6]
Koraon T. A.						2830	3872		5610	7832
							[36.8]			[39.6]

SOURCE : District Census, Allahabad, 1951-1981.
District Statistical Bulletin, 1997.

Appendix : 6

DENSITY OF POPULATION IN URBAN AREAS [PER SQ. KMS.]
DISTRICT ALLAHABAD, 1971-1991

Town / City	1971	1981	1991
Ajhuwa T. A.		980	1181
Sirathu T. A.		649	751
Karari T. A.		13810	17266
Manjhanpur T. A.		1156	19743
Bharwari T. A.		6232	8033
Sarai Aqil T. A.		4789	6254
Chail T. A.		979	1411
Allahabad U. A.	2338	871	10277
Nindura T. A.		1110	1524
Mauaima T. A.	482	1739	2567
Phulpur T. A.	416	4101	6400
Jhusi T. A.		5233	7493
Handia T. A.		1019	2399
Shankargarh T. A.		2110	3627
Bharatganj T. A.	192	2550	4794
Sirsa T. A.	491	3416	5161
Koraon T. A.			2122
Total	577	4120	6784

SOURCE : District Statistical Bulletin, 1977, 1987.
Census of India, U.P., 1991.

Appendix : 7

LANDUSE PATTERN [PERCENT OF TOTAL AVAILABLE AREAS]
DISTRICT ALLAHABAD, 1999

Dev.Block	Forest Land	Cultivable Barren Land	Fallow land	Land Not Suitable for Agriculture	Other Uses	Grazing Land	Horticulture	Net Sowi Area
Kaurihar	0.01	4.79	22.62	7.17	21.98	0.25	1.91	41.27
Holagarh		1.06	11.49	2.51	11.28	0.71	3.67	69.16
Mauaima	0.08	1.59	10.36	3.83	19.01	0.56	1.83	69.38
Soraon	0.07	1.59	12.29	1.19	12.66	0.13	2.51	69.56
Baharia		0.78	4.39	8.53	7.37	0.50	1.27	77.14
Phulpur		2.79	3.23	5.81	10.83	0.78	1.24	75.31
Bhadurpur		1.99	6.80	8.18	8.35	0.01	3.87	70.79
Pratappur		0.48	11.72	1.83	11.49	0.12	2.03	72.31
Saidabad	0.01	0.66	9.54	2.31	12.67	0.04	2.81	71.95
Dhanupur	0.10	0.68	7.62	1.09	11.60	0.07	3.99	74.85
Handia		0.66	9.49	1.76	13.18	0.06	2.10	71.53
Jasra		1.88	12.88	4.83	11.59	0.02	0.33	68.47
Shankargarh	10.27	8.82	17.06	3.26	8.00	0.03	0.38	52.18

Chaka		2.60	12.56	11.97	19.27		2.08	51.51
Karchhana		1.55	10.33	0.66	12.56	0.01	2.59	72.30
Kaudhiyara		1.60	8.17	0.78	10.15	0.30	1.24	77.25
Uruwan		0.81	6.68	1.80	17.52	0.01	3.58	69.61
Meja	8.55	2.87	9.55	6.16	9.04	0.01	0.45	63.33
Koraon	8.50	0.49	1.27	1.02	3.64	1.37	0.43	83.26
Manda	13.75	4.99	10.40	1.40	9.58	0.03	1.23	58.61
Total Rural	3.74	2.51	9.58	3.73	10.77	0.33	1.60	67.87
Total Urban		2.97	16.86	3.43	25.71		1.03	49.70
Total District	3.69	2.52	9.67	3.72	10.95	0.32	1.59	67.66

SOURCE : District Statistical Bulletin 2000.

Appendix : 8

AREA IN MAJOR CROPS [PERCENT OF TOTAL AVAILABLE AREAS]
DISTRICT ALLAHABAD, 1999

Dev. Block	Total Cereals	Total Pules	Commercial Crops
Kaurihar	49.79	6.39	0.39
Holagarh	102.13	8.26	0.18
Mauaima	104.56	8.76	0.11
Soraon	87.44	10.71	0.12
Baharia	87.69	7.48	0.19
Phulpur	81.72	6.78	0.15
Bhadurpur	72.68	12.47	0.18
Pratappur	93.93	5.48	0.73
Saidabad	88.78	10.24	0.42
Dhanupur	109.31	6.38	0.67
Handia	98.98	6.63	0.31
Jasra	69.46	15.23	2.71
Shankargarh	45.11	15.00	4.84
Chaka	59.34	7.40	0.51
Karchhana	85.85	12.96	0.85
Kaudhiyara	107.54	9.00	0.55
Uruwân	79.34	12.80	0.76
Meja	65.56	14.12	5.27
Koraon	123.82	23.67	3.61
Manda	95.01	12.71	3.92
Total Rural	85.07	12.42	2.01
Total Urban	55.79	1.47	0.58
Total District	84.53	12.29	2.00

SOURCE : District Statistical Bulletin 2000.

Appendix : 9

AREA IN MAJOR CROPS [PERCENT OF TOTAL AVAILABLE AREAS]
DISTRICT ALLAHABAD, 1999

Dev. Block	Rice	Wheat	Sugarcane	Potato
Kaurihar	19.05	22.37	0.01	4.07
Holagarh	53.65	45.24	0.07	14.67
Mauaima	56.85	46.24	0.19	11.67
Soraon	38.12	41.02	0.02	13.48
Baharia	32.93	46.24	0.26	3.36
Phulpur	39.04	38.67	0.38	3.76
Bhadurpur	10.69	39.11	0.02	2.40
Pratappur	36.51	50.32	0.83	2.43
Saidabad	37.84	43.48	0.23	2.94
Dhanupur	44.23	54.82	1.36	2.56
Handia	33.34	47.72	0.70	0.73
Jasra	20.39	34.76	0.01	0.42
Shankargarh	14.86	25.05		0.01
Chaka	14.14	29.01	0.33	1.31
Karchhana	24.41	41.11	1.26	1.71
Kaudhiyara	45.77	51.88	0.71	1.58
Uruwan	18.88	35.48	0.22	2.47
Meja	27.77	30.06	0.04	0.41
Koraon	70.25	43.33	0.09	0.25
Manda	48.68	36.19	0.14	0.53
Total Rural	35.95	38.56	0.27	2.48
Total Urban	26.03	25.85	0.05	2.02
Total District	35.83	38.41	0.27	2.48

SOURCE : District Statistical Bulletin 2000.

Appendix : 10

LANDUSE & IRRIGATION INTENSITY
DISTRICT ALLAHABAD, 1999

Dev. Block	Landuse Intensity	Irrigation Intensity
Kaurihar	157.12	180.18
Holagarh	188.88	200.02
Mauaima	186.94	185.31
Soraon	174.74	180.74
Baharia	135.82	142.02
Phulpur	141.02	144.75
Bhadurpur	120.75	122.84
Pratappur	148.71	142.01
Saidabad	153.51	150.26
Dhanupur	165.78	155.85
Handia	158.81	144.87
Jasra	131.79	131.57
Shankargarh	120.41	140.94
Chaka	138.79	132.38
Karchhana	144.68	148.58
Kaudhiyara	161.96	166.85
Uruwan	141.84	148.33
Meja	136.11	118.62
Koraon	179.04	178.28
Manda	187.93	207.18
Total Rural	154.07	158.23
Total Urban	130.66	132.18
Total District	153.87	157.97

SOURCE : District Statistical Bulletin 2000.

Appendix : 11

LENGTH OF METALLED ROAD [IN KMS]
DISTRICT ALLAHABAD, 1999

Dev. Block	Total Length (Kms.)	Total Length Per 1000 Sq Kms.	Total Length Per 100000 Popu.
Kaurihar	103	258.5	38.2
Holagarh	81	546.9	64.6
Mauaima	86	569.9	72.8
Soraon	126	932.6	94.4
Baharia	90	361.7	49.7
Phulpur	135	599.2	90.0
Bahadurpur	120	453.3	57.7
Pratappur	128	622.9	85.1
Saidabad	116	586.5	69.7
Dhanupur	105	605.9	69.3
Handia	136	847.4	98.7
Jasra	122	452.5	108.5
Shankargarh	131	282.5	127.6
Chaka	126	820.3	99.0
Karchhana	115	494.0	74.2
Kaudhiyara	96	473.8	96.9
Uruwan	101	598.0	76.9
Meja	122	273.0	104.0
Koraon	126	172.8	68.9
Manda	101	290.7	86.1
Total	2266	425.9	77.2

SOURCE : District Statistical Bulletin, 2000.

Appendix : 12

NO. OF RECOGNISED EDUCATIONAL INSTITUTIONS [PER LAKH POPU.] DISTRICT ALLAHABAD, 1999

Dev. Block	J. B. School	S. B. School	High School
Kaurihar	49.0	16.7	3.7
Holagarh	60.6	20.7	4.8
Mauaima	56.7	11.9	4.2
Soraon	53.9	17.2	6.7
Baharia	53.0	11.6	3.3
Phulpur	52.0	15.3	6.7
Bahadurpur	48.5	12.5	7.7
Pratappur	60.5	13.3	5.3
Saidabad	55.5	19.2	5.4
Dhanupur	48.9	10.6	4.0
Handia	58.1	14.5	8.0
Jasra	72.1	21.4	12.5
Shankargarh	82.8	37.0	5.8
Chaka	53.4	16.5	7.1
Karchhana	66.5	16.1	5.2
Kaudhiyara	60.5	24.2	5.0
Uruwan	64.7	19.8	7.6
Meja	67.4	17.1	6.0
Koraon	65.6	16.4	4.4
Manda	71.6	13.6	6.8
Total	58.7	16.7	5.8

SOURCE : District Statistical Bulletin, 2000.

Appendix : 13

MEDICAL FACILITIES [ALLOPATHIC] PER LAKH POPULATION DISTRICT ALLAHABAD, 1999

Dev. Block	Hospital / Dispensary	No. Of Beds
Kaurihar	3.3	14.1
Holagarh	2.4	11.2
Mauaima	2.5	11.9
Soraon	4.5	60.7
Baharia	1.7	6.6
Phulpur	3.3	18.7
Bahadurpur	2.9	11.5
Pratappur	2.7	10.6
Saidabad	3.0	12.0
Dhanupur	2.0	7.9
Handia	3.6	34.8
Jasra	6.2	49.8
Shankargarh	5.8	52.6
Chaka	1.6	26.7
Karchhana	3.2	28.4
Kaudhiyara	4.0	38.3
Uruwan	3.8	36.5
Meja	4.3	39.2
Koraon	3.8	30.6
Manda	6.0	49.5
Total	3.4	25.2

SOURCE : District Statistical Bulletin, 2000.

Appendix : 14

BLOCKWISE PARAMETERS OF DEVELOPMENT
DISTRICT ALLAHABAD, 1999

Dev. Block	Urban Popu. % 1991	Electrified Villages %	Villages Pipe Water Supply %	Fertilizers / Hec. In Kg.	Irrigated Area %
Kaurihar	6.7	59.4	100.0	214.6	180.2
Holagarh	0.0	100.0	97.8	218.8	200.0
Mauaima	10.0	100.0	100.0	239.5	185.3
Soraon	0.0	100.0	94.6	266.7	180.7
Baharia	0.0	100.0	94.8	154.6	142.0
Phulpur	10.1	100.0	96.7	184.3	144.8
Bahadurpur	3.7	100.0	76.6	223.6	122.8
Pratappur	0.0	100.0	98.5	190.9	142.0
Saidabad	0.0	100.0	96.9	180.5	150.3
Dhanupur	0.0	100.0	95.0	174.7	155.8
Handia	8.6	100.0	94.7	213.1	144.9
Jasra	0.0	100.0	95.6	131.0	131.6
Shankargarh	9.4	68.0	87.7	114.6	140.9

Chaka	0.0	100.0	74.0	246.5	132.4
Karchhana	0.0	97.5	90.8	131.3	148.6
Kaudhiyara	0.0	91.6	100.0	119.5	166.9
Uruwan	6.6	100.0	75.8	209.5	148.3
Meja	0.0	68.9	93.7	92.8	118.6
Koraon	4.1	66.5	96.7	42.2	178.3
Manda	9.6	67.5	90.7	85.5	207.2
Total	24.53	88.7	91.1	141.4	158.2

SOURCE : District Statistical Bulletin, 2000.